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GOVERNMENT OF INDIA

TARIFF COMMISSION

REPORT
on the
Continuance of Protection to the Electric Motor Industry

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BOMBAY, 1963

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Report on the continuance of protection to the Electric Motor Industry—1963.

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GOVERNMENT OF INDIA

MINISTRY OF INTERNATIONAL TRADE

New Delhi, the 20th November, 1963.

NOTIFICATION

Tariffs

No. 5(2)-Tar/63.—In exercise of the powers conferred by sub-section (1) of section 3A of the Indian Tariff Act, 1934 (32 of 1934), the Central Government hereby directs that with immediate effect there shall be levied on the articles specified in column (1) of the Table hereto annexed, when imported into India, a duty of customs of such amount as is specified in the corresponding entry in column (2) thereof.

THE TABLE

Name of articles	Amount of duty of customs [in place of the duty specified in the First Schedule to the Indian Tariff Act, 1934 (32 of 1934)]
1	2
(*i*) Squirrel cage and slip-ring induction motors of a brake-horse-power exceeding 500 but not exceeding 3,000, excluding variable speed commutator motors ;	15 per cent *ad valorem*.
(*ii*) Synchronous motors of a brake-horse-power not exceeding 3,000 but not less than one brake-horse-power;	15 per cent *ad valorem*.
(*iii*) Component parts of electric motors specified in (*i*) and (*ii*) above.	20 per cent *ad valorem*.

NOTE.—For the removal of doubts it is hereby clarified that the customs duty to which the said articles are liable under section 2A of the Indian Tariff Act, 1934 (32 of 1934), and the surcharge leviable under sub-section (1) of section 23 of the Finance Act, 1963 (13 of 1963), shall be in addition to the duty leviable under this notification.

H. D. SHOURIE,
Joint Secretary to the Government of India.

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1—13 T. C. Bom./63

GOVERNMENT OF INDIA

MINISTRY OF INTERNATIONAL TRADE

New Delhi, the 20th November, 1963.

RESOLUTION

Tariffs

No. 5(2)-Tar/63.—The Tariff Commission has submitted its Report on the continuance of protection to the Electric Motor Industry on the basis of an inquiry undertaken by it under sections 11(e) and 13 of the Tariff Commission Act, 1951 (50 of 1951). Its recommendations are as follows:—

(1) Protection to the electric motor industry should be continued for a further period of two years ending 31st December, 1965, and the scheme of protection should cover (i) squirrel cage and slip-ring induction motors and synchronous motors of a brake-horse power up to 3,000 h.p. but excluding variable speed commutator motors; (ii) single phase motors of 1 h.p. to 3 h.p.; (iii) fractional horse power motors; and (iv) component parts of all these types of motors excluding control gear.

(2) The existing rates of protective duties should be continued for the extended period of two years and the duty of 15 per cent should be made applicable to squirrel cage and slip-ring induction motors and synchronous motors of higher ratings over 500 h.p. up to 3,000 h.p.

(3) In order to avoid any possible deficiency in production during the next few years, Government should see to expeditious installation of the capacity already licensed and assist in future expansion of double shift working in all suitable units by ensuring adequate supply and proper utilisation of raw materials. If on a reassessment of the position these measures are found inadequate for stepping up the production to the required level of demand timely action should be taken for licensing of additional capacity.

(4) Government should give the requisite facilities with higher priority either to the existing producers of stampings or to the manufacturers of motors whose own requirements are sizeable to increase the total installed capacity to a commensurate level as this would involve a saving for capital equipment required for fresh units and facilitate optimum utilisation of the existing capacity.

(5) The Department of Technical Development should examine the question of availability of enamelled copper wires for motors of bigger and larger h.p. and direct the required modification in the pattern of production following up, if necessary by larger allocation of copper.

(6) A special priority may be accorded to the electric motor industry as its products constitute an important item of capital equipment and has assumed greater significance for speeding up the industrialisation of the country.

(7) Having regard to the avoidable strain on foreign exchange and the wasteful use of scarce raw materials resulting from the present manufacturing practices of the producers, Government should take steps for regulating allocation of raw materials to the industry in a manner that will ensure their most economical and fullest possible utilisation with the adoption of class 'E' insulation for all approved uses and lay down a phased but definite programme for the industry for the change-over in the shortest possible time.

(8) As in the case of cable industry, Government should set an early date as target for the industry to change over to aluminium die cast rotors for motors (squirrel cage) progressively up to 30 h.p. Government should, however, give necessary facilities to the industry to enable it to acquire the requisite equipment and dies for this purpose.

(9) Government should undertake an examination of the possibility of establishing centralised services for the small scale sector in suitable areas as early as possible with a view to bringing the economic advantages of aluminium die-cast rotors within the reach of small scale units.

(10) The non-acceptance of motors with higher temperature rise by the Insurance Association of India for use in ring frames etc. (although such motors are accepted in the textile industry in other countries) is perhaps a case of adherence to traditions rather than based on any special study and Government should ask insurers to adopt a more progressive and helpful attitude.

(11) The complaints about irregular and short supply of steel rods and bars are brought to the notice of Government for an assessment of the industry's present and future demands and for laying down a programme to meet its requirements adequately either from indigenous sources or from imports.

(12) Steps should be taken by TISCO to expedite the installation of its additional capacity and Government should afford the necessary facilities to it in this direction. Hindustan Steel should also explore the possibility of manufacturing dynamo grade sheet steel before April 1966 by any feasible adjustments in its production programme.

(13) The progress made by the industry in respect of the change over to class 'E' insulation and adoption of aluminium die-cast rotors, which have great potentialities for reducing cost, has not been satisfactory.

(14) The industry which has been enjoying protection for over fourteen years owes a special obligation to the consumer to requite his burden fully and at the earliest as also for strengthening the economy of the country by improving the export prospects which are conditioned by an effective reduction of the prices to a competitive level.

2. Government accept recommendations (1) and (2). The duty recommended by the Tariff Commission in respect of motors hitherto not covered by the scheme of protection is being brought into force with immediate effect by notification under section 3A of the Indian Tariff Act, 1934, published separately in the Gazette of India to-day. The necessary legislation in Parliament will also be undertaken in due course.

3. Government have taken note of recommendations (3) to (11) and steps will be taken to implement them as far as possible.

4. Government have also taken note of recommendation (12) and steps will be taken to implement it as far as possible. Attention of TISCO and Hindustan Steel is also invited to this recommendation.

5. Attention of the industry is drawn to recommendations (13) and (14).

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ORDER

Ordered that the Resolution be published in the *Gazette of India* and a copy thereof communicated to all concerned.

H. D. SHOURIE,
Joint Secretary to the Government of India.

REPORT ON THE CONTINUANCE OF PROTECTION TO THE ELECTRIC MOTOR INDUSTRY

Previous inquiries.

1. Protection to the electric motor industry has been the subject of five tariff inquiries in the past, the first two by the Tariff Board in 1948 and 1949 and the later three by us in 1955, 1958 and 1961. After the first inquiry in 1948 protection was granted to this industry up to 31st March, 1950 by converting the then existing revenue duty of 10 per cent *ad valorem* on electric motors into an equivalent protective duty. In 1949 Government agreed to continuance of protection to the industry for a further period of three years which was later extended till 31st December, 1955, but did not accept the Board's recommendation to raise the protective duty to 15 per cent *ad valorem* on imports of electric motors up to 20 horse power including fractional horse power motors and component parts thereof. The protective duty on complete motors and component parts was raised to 10½ per cent *ad valorem* by the Finance Act, 1951 and later the duty on component parts was further increased to 20 per cent *ad valorem* by the Finance Act, 1954. The third inquiry was undertaken by us in 1955 and we recommended that protection to the industry should be continued for a further period of three years and the scheme of protection should cover squirrel cage induction motors of brake-horse power not exceeding 100 but not less than ¼ h.p. and slip ring motors of h.p. not exceeding 100 but not less than one h.p., excluding flame-proof motors and variable speed commutator motors. As regards protective duty we recommended 15 per cent *ad valorem* for complete motors and 20 per cent *ad valorem* for component parts of such motors. Government accepted the above recommendations. After the fourth inquiry by us in 1958, the same scheme of protection was further continued for a period of three years. We undertook the last inquiry into this industry in 1961 and extended the scope of the inquiry to cover motors up to 500 h.p. including flame-proof motors, single phase motors up to and including 3 h.p. and fractional horse power motors. As regards protective duty we recommended 15 per cent *ad valorem* for squirrel cage induction motors and slip ring motors, single phase motors and f.h.p. motors, 20 per cent *ad valorem* for component parts of the above motors and 35 per cent *ad valorem* for fractional horse power motors of less than ¼ h.p. and parts thereof. Government accepted the above recommendations and protection has been continued for a further period of two years ending 31st December, 1963.

Present inquiry.

2. Since protection granted to this industry is due to expire by the end of this year, we have undertaken the present inquiry under Section 11(e) read with Section 13 of the Tariff Commission Act, 1951, whereby we are empowered to investigate into the working of protection granted to an industry with a view to its increase, decrease, modification or abolition according to the circumstances of the case.

Method of inquiry.

3.1. In the first week of January, 1963 questionnaires were sent to producers, consumers and importers of electric motors and a press-note was issued inviting those interested in the inquiry to obtain copies of the relevant questionnaires and furnish their replies. The Department of Technical Development (hereinafter referred to as the D.T.D.) was requested to send a memorandum on the present position and problems of the industry. The Development Commissioner, Small Scale Industries, was requested to give information on the small-scale sector of the industry. The Directors of Industries in the States where units manufacturing motors are situated were addressed for information regarding the availability of raw materials and assistance, if any, rendered by them to this industry. The State Governments were also requested to communicate their views on protection to the industry. Information regarding c.i.f. prices and landed costs of imported electric motors was called for from Collectors of Customs at principal ports. Our High Commission in London and Embassies in West Germany, the U.S.A., and Japan were addressed for information on f.o.b. quotations of different types of motors for export to India. Memoranda on various aspects of the industry were called for from the Indian Electrical Manufacturers' Association and the Small Scale Electric Motor Manufacturers' Association. Letters were issued to the Director General of Supplies and Disposals, National Physical Laboratory, The Central Mining and Research Station, Government Test House, The Indian Standards Institution and producers of principal raw materials on specific points pertaining to relevant aspects of the inquiry. A list of those to whom questionnaires/letters were issued and from whom replies or memoranda were received is given in Appendix I.

3.2. Two units, namely, Kirloskar Electric Co. Ltd., Bangalore and Bharat Bijlee Ltd., Bombay, were selected for cost investigation, the former having been costed for the previous inquiries also. A list of units visited by us and by officers of the Commission is given in Appendix II.

3.3. A public inquiry into this industry was held on the 29th May, 1963 at the Commission's office in Bombay. A list of those who attended it is given in Appendix III.

Implementation of ancillary recommendations made in the Commission's last Report.

4.1. In our last Report (1961) on the Electric Motor Industry we made several recommendations on matters other than tariff protection and the extent to which these have been implemented is reviewed.

4.2. *Recommendation No. 1 :*

> "Government should give all possible assistance to the electric motor industry to work double shift especially by ensuring adequate supply of raw materials."

The Department of Technical Development has informed us that already most of the units are working double shift, that the main raw materials are available from indigenous sources, no special difficulty being experienced in this respect, and that where possible the shortfall is being met from imports. In regard to small scale units limited information has been furnished by the Development Commissioner, Small Scale Industries, indicating the working of such units on single shift, which is attributed mainly to restricted demand. It is reported that new licences are being granted on the basis of double shift working. Most of the producers, however, have represented that their production is being hampered by paucity of essential raw materials. This is further discussed in paragraphs 8 and 9.

4.3. *Recommendation No. 2 :*

> "Government should encourage the manufacturers of electric motors to use aluminium cast rotors and for this purpose assist the industry to procure the necessary equipment for an early changeover."

At the time of the last inquiry Jyoti Ltd., Baroda, and Associated Electrical Industries, Calcutta, General Electric Co., Calcutta, and Bharat Bijlee, Bombay, were producing squirrel cage motors with aluminium die-cast rotors. During the last two years further progress has been made by these units and a few others. We are informed by Kirloskar Electric Co. Ltd., Bangalore, that it is now producing motors up to 5 h.p. with aluminium die-cast rotors. This, however, would represent only ⅛th of its total production. Crompton Parkinson, Bombay, one of the largest producers, has indicated—despite its having the advantage of the experience of its parent company in U.K.—that it is still planning to change to aluminium die-cast rotors and that its plan would cover a limited range of its production, namely, single phase motors. Many other units also do not appear to have made any significant progress in this direction. Some of the units have complained that this is due to difficulties in obtaining licence for machinery for pressure die casting. But the representative of the D.T.D. stated at the public inquiry that all possible help was being given to the units to procure necessary equipment and he assured that requests for any further help to the industry in this direction would receive careful consideration. The Development Commissioner (Small Scale Industries) has reported that the small units have expressed their inability to change over to die-cast aluminium rotors immediately, as it involves large investment of capital on additional machinery. One unit in Madras which does gravity die casting of rotors for a local producer of motors has complained of difficulties on account of excise duty and formalities which are extended even to rough components. If an independent unit has to specialise in the manufacture of die-cast rotors, this could come about only with greater standardisation of types and sizes. The production of motors by small units will then become more economical. The progress so far made in this respect since the last inquiry by the organised as well as the small scale sector has not been satisfactory. This is further discussed in paragraphs 8 and 9.3.1.

4.4. *Recommendation No. 3 :*

> "Government should carefully assess the demand for fractional h.p. motors and production capacity of the electric motor industry in both sectors for manufacture of such motors before issuing import licences."

The D.T.D. has informed us that no licences are being granted now for the import of fractional h.p. motors to established importers, that even the actual user's requirement is screened carefully and only special fractional horse power motors not produced indigenously are allowed to be imported.

4.5. *Recommendation No.* 4*:*

> "Government should take steps to enable the electric motor industry to shorten its delivery periods by allowing imports of necessary raw materials or otherwise."

The D.T.D. has informed us that it has not received any complaint regarding long deliveries by the producers, and that raw materials being available indigenously it should not present any problem to the industry. The Development Commissioner has reported that small scale units which are supplying only against orders do not also find much difficulty in executing the orders within the stipulated time. According to information furnished by producers and consumers the delivery position for the bulk of motors *i.e.* up to 50 h.p. has improved and is comfortable. Only for motors of higher h.p., complaints of long delivery period have been received, the delays being attributed by the producers to the difficulties about raw materials.

4.6. *Recommendation No.* 5*:*

> "The Development Commissioner for Small Scale Industries, in consultation with the Directors of Industries in the States, should take necessary steps to improve the present arrangements of distributing raw materials to the small scale units in the electric motor industry."

We are informed by the Development Commissioner that he had drawn the attention of all the Directors of Industries to our recommendations and that steps have since been taken to increase the allocation of raw materials to small scale units. While individual units still face difficulties, the production in the small scale sector has increased substantially during the last two years.

4.7. *Recommendation No.* 6*:*

> "Steps to establish additional capacity for the manufacture of stampings should be expedited."

The D.T.D. has informed us that additional capacities for the manufacture of stampings have been licensed and are under implementation. Sankey Electrical Stampings Ltd., Bombay, which is by far the largest producer of stampings, has stated that it has been able to obtain adequate industrial licences to increase the capacities at its various factories for the manufacture of stampings, which, in its opinion, is expected to cater substantially to the anticipated requirements of the motor industry during the Third Plan period. Devidayal Stainless Steel Industries Pvt. Ltd., Bombay, the second unit which had been planning for the manufacture of stampings at the time of the last inquiry has informed that its factory for electrical stampings has gone into production. Some of the electric motor manufacturers have also indicated that they are either substantially meeting their requirements of stampings for their own production or have plans to produce stampings. The question of future requirements of stampings is discussed in detail under paragraph 8.

4.8. *Recommendation No. 7 :*

> "Manufacturers of electric motors should expedite measures to change over to class 'E' insulation without further delay."

Replies received by us from the producers indicated that only one of them namely, Bharat Bijlee Ltd., has taken definite action in this regard and has been producing motors from 1 to 10 h.p. with class 'E' insulation. Most of the other large producers have reported that they are still in the planning stage in consultation with their collaborators. Kirloskar Electric Co. Ltd., Bangalore, has informed that it has produced on experimental basis a range of designs for the production of class 'E' motors and has reiterated that as there is considerable consumer resistance for motors of high temperature rise, as of the 'E' type, it will be some time before such motors will be sold in the Indian market. Jyoti Ltd. has started production of class 'E' motors on a limited scale. Associated Electrical Industries Ltd. has reported that in connection with the proposed change over it is still looking for suitable insulation materials from indigenous sources and its efforts in this direction have not so far been fruitful. British India Electric Construction Co. Ltd., Calcutta, has informed that it is negotiating with its principals in the U.K. to manufacture electric motors up to 25 h.p. with class 'E' insulation, and after the designs are finalised it expects to commence production of the new type from early 1964. The General Electric Co. of India (Mfg.) Pvt. Ltd., Calcutta, has stated that it is making arrangements to change over to class 'E' insulation but it will take time to convert the whole range. Crompton Parkinson (Works) Ltd., Bombay, has stated that it is in touch with its principals in England for obtaining help in developing class 'E' insulated motors with aluminium die-cast rotors, and does not anticipate any difficulty in implementing the introduction of these motors. Some of the other producers have also reported different degrees of progress in this direction. Regarding the small scale sector the Development Commissioner has reported that small scale units have no immediate scheme to change over to class 'E' insulation. It would thus appear that the progress made in respect of the change over to class 'E' insulation since our last inquiry has not been satisfactory, particularly having regard to the long time which has elapsed since then and the resourcefulness of the producers who have high level technical collaboration. The slow progress has been due largely to the inertia usually developed by an industry in a sheltered market. We consider the points urged by some of the producers against the prospects of an early and effective implementation of the scheme on the ground of consumer resistance, non-availability of insulation materials from indigenous sources etc. to be unduly or unjustifiably exaggerated. The matter is fully discussed in paragraph 9.2.

Scope of the inquiry.

5. The present scheme of protection which is applicable to three phase and single phase A.C. motors covers three phase squirrel cage and slip ring motors up to and including 500 h.p. including flame-proof motors, single phase motors up to and including 3 h.p. and fractional horse power motors. During the present inquiry only one producer, namely, Jyoti Limited, Baroda, has asked for extending the scope up to 2,000 h.p. However, keeping in view the manufacturing programme of Heavy Electricals (India) Ltd. (HEL), Bhopal, and the manufacturing facilities for motors of higher ratings being developed by some of the producers, the Department of Technical Development has requested the extension of the scope of inquiry to include motors up to 3,000 h.p. and 6.6 KV. At the public inquiry the representative of HEL stated that motors of even above 3,000 h.p. and up to 11 KV will be manufactured by it and that it had specific orders on hand for these to be executed during the next two years. Very few units in the private sector are however ready to produce motors of over 500 h.p. After detailed discussions at the public inquiry it was agreed that the scope of the inquiry should be extended to include motors up to 3,000 h.p. in order to give the desired stimulus for further diversification and for the manufacture of motors of higher ratings and voltage within the country. We are advised that since motors are manufactured only up to 11 KV and motors up to this voltage will be produced by HEL, the voltage need not be specified, and also that since motors of higher ratings are sometimes preferred to be synchronous motors due to improvement in the overall power factor of the plant resulting from their use, these motors also should be included within the extended scope. In the light of these and other relevant considerations we have decided to extend the scope of the inquiry to cover squirrel cage and slip-ring motors up to and including 3,000 h.p. and also include synchronous motors.

Progress and present position of the industry, capacity and production.

6.1. As stated in our last Report (1961) there were 27 units in the large scale sector of the industry with a capacity of 1,136,040 h.p. on single shift. Besides this, in connection with the present inquiry the D.T.D. has reported that additional licences totalling 1,433,620 h.p. have since been granted comprising 611,220 h.p. for expansion of 7 existing units and 822,400 h.p. for establishment of 21 new units. We have also noted that the production of some of the units far exceeds their licensed capacity. This is a desirable feature. But in accordance with the present procedure adopted by the D.T.D. for assessing capacity irrespective of shifts on the basis of the performances of the units, the capacities of many units need to be reassessed for a more realistic appraisal of the potential of the industry and *inter alia* of its different constituent units. In view of these factors we suggest that the D.T.D. should bring its list up-to-date by including all the licensed units which are already in production and also by giving the reassessed capacity of the units based on their recent performances. Pending such a revised list, for our Report we have accepted the capacity as furnished by the D.T.D. Details of these capacities installed and additional capacities licensed together with the production of the manufacturing units in 1960, 1961 and 1962 are given in Appendix IV. Since our last inquiry Heavy Electricals (India) Ltd., Bhopal, has gone into production with a capacity of 75,000 h.p. Including it the total installed capacity of the large scale sector of the industry currently stands at 1,211,040 h.p. and is due to increase to 2,644,660 h.p. with the installation of the additional capacities licensed.

6.2. According to information furnished by the Development Commissioner the number of units in the small scale sector in 1959 was 74 with a total capacity of 266,000 h.p. and employment of 2,890 persons. He has now stated that in 1962 the number of units has gone up to 113 with estimated total capacity of 321,722 h.p. and employment of 4,404 persons, and their estimated production during the year was 128,757 h.p. We have, however, noted that five units in Coimbatore (Madras State) namely, Texmo Industries, Karthikeya Foundry, Broadway Engineering & Transport Co., Ramakrishna Mission Vidyalaya and Coimbatore Premier Corporation with a total annual installed capacity of 29,000 h.p. included in the list of Development Commissioner are also registered with the D.T.D. we have taken these units out of the list of small scale sector and the figures of number, capacity and production (1962) stand modified as 108 units, 292,722 h.p. and 87,780 h.p. respectively. Another eight units situated in Coimbatore, which are at present manufacturing motors and are registered with the Development Commissioner, have obtained licences for a total capacity of 46,000 h.p. under Industries (Development and Regulation) Act, 1951. Since these units are indicated by the D.T.D. as prospective producers, for the time being, till an up-to-date list is made by the D.T.D., we have taken their capacity and production as part of the capacity of the small scale sector. The units in this sector have been manufacturing (i) fractional horse power motors—single as well as 3 phase and universal motors, (ii) single phase motors up to 5 h.p. and (iii) A.C. squirrel cage induction motors up to 50 h.p., the bulk of their production being mainly fractional horse power motors and squirrel cage motors up to 10 h.p. A statement showing the state-wise distribution of the units in the small scale sector along with their production in the years 1960, 1961 and 1962 as furnished by the Development Commissioner is given in Appendix V. The Development Commissioner has reported a high percentage of unutilised capacity in this sector due to shortage of raw materials and marketing difficulties, and has also pointed out that his figures of capacity are based on estimates which are liable to err on the high side. The Indian Electrical Manufacturers' Association has informed that according to information gathered by it there are about 140 units in the small scale sector with a capacity of 0.4 million h.p. We bring this to the notice of the Development Commissioner for necessary verification, and meanwhile in consideration of the production actually achieved by the small scale sector, have assumed its capacity as 0.1 million h.p.

6.3. *Production :*

6.3.1. The total production of electric motors in the large scale and small scale sectors during the years 1960, 1961 and 1962 was as follows: —

Year	Large Scale		Small Scale		Total	
	No.	H.P.	No.	H.P.	No.	H.P.
1960 . .	132,910	740,648	38,689	62,796	171,599	803,444
1961 . .	145,399	854,641	53,833	66,318	199,232	920,959
1962 . .	154,171	972,138	61,843	87,780	216,014	1,059,918

The industry in both the sectors has considerably increased its production since our last inquiry. The production of the large scale sector in terms of h.p. increased in 1962 by about 32 per cent compared to that of 1960 and the production of the small scale sector rose by about 40 per cent during the same period. The share of small scale sector in the total output in terms of h.p. was 7.8 per cent in 1960 and 8.3 per cent in 1962; in terms of numbers of motors its share stood at 22.5 per cent in 1960 and 28.6 per cent in 1962. The average h.p. per motor produced in the organised sector (*i.e.* production in h.p. divided by numbers) in 1962 was about 6.3 h.p. and that in the small scale sector 1.4 h.p. as compared to 5.3 h.p. and 1.7 h.p. in the two sectors respectively in 1960.

6.3.2. In respect of motors produced in the large scale sector the D.T.D. has given a detailed break-up of the production unitwise according to ranges of h.p. for the three years. A summary indicating the latest trends of production of the units in the industry is given in Appendix VI. For facilitating comparison the proportion of the output of motors of different h.p. ranges are indicated:

H.P. Range		1960	%	1961	%	1962	%
Below 1 h.p.	h.p.	11,631	1·6	12,519	1·5	8,637	0·9
	Nos.	26,411	19·9	24,192	16·6	19,852	12·9
Above 1 to 30 h.p. .	h.p.	601,285	81·2	632,064	74·0	706,401	72·7
	Nos.	104,178	78·4	117,699	80·9	130,327	84·5
Above 30 to 50 h.p. .	h.p.	65,674	8·8	87,997	10·3	88,727	9·1
	Nos.	1,549	1·1	2,109	1·5	2,115	1·4
Above 50 to below 100 h.p.	h.p.	48,573	6·5	77,345	9·0	111,053	11·4
	Nos.	680	0·5	1,104	0·8	1,465	1·0
Above 100 to below 200 h.p.	h.p.	12,160	1·7	36,786	4·3	49,215	5·1
	Nos.	87	0·1	270	0·2	378	0·2
200 h.p. and above .	h.p.	1,325	0·2	7,930	0·9	8,105	0·8
	Nos.	5	. .	25	. .	34	. .
Total h.p. .		740,648	100	854,641	100	972,138	100
Total Nos. .		132,910	100	145,399	100	154,171	100

It will be noticed that production of fractional horse power motors in the large scale sector has been showing a declining trend, while production of motors of higher horse power has been increasing both in numbers, as well as in total horse power. As previously the bulk of production continues to be under 30 h.p. accounting for 73.6 per cent of the total h.p. in 1962 as against 82.8 per cent in 1960.

6.3.3. In our last Report (1961) we had observed that certain units in the large scale sector had plans for the immediate future to embark on the manufacture of some special types of motors such as flame-proof and explosion-proof motors, variable speed motors, multispeed pole changing motors, synchronous motors, motors for sugar centrifuges and other special types. This trend towards diversification, welcome in itself, was then explained to us to be induced by difficulties caused by the fall in demand for the common types of motors during the preceding years, growing competition from small scale sector and rising demand for special types of motors. Our present inquiry has, however, revealed that sufficient progress has not been made since by the industry in the direction of diversification. Only Bharat Bijlee, Cromptons and Kirloskar have commenced the production of flame proof and explosion proof motors and P.S.G. Industrial Institute has reported the development of variable speed motors. None of the other producers appears to have yet taken concrete steps for the diversification of output although some of them have claimed to be pursuing their plans in this respect. We would like to impress on the producers of electric motors the desirability of diversification of output. This would aid the integrated development of industrialisation and the manufacture of machinery in the country for meeting the rapidly growing demands from different industries such as chemical, paper, cement and sugar industries.

Domestic demand.

7.1. In 1961 we estimated the demand for electric motors for that year at 1 million h.p. and expected it to increase to 2.6 million h.p. in 1964. We had then assumed that the addition to the generating capacity in 1964 would be 1.3 million k.w. and 2 would be the appropriate factor for multiplying the additional generating capacity in k.w. to determine the h.p. requirements of motors. We had therein raised the factor of 1.66 arrived at by the Development Council for Heavy Electrical Industries on the assumptions of 40 per cent load factor and availability of 50 per cent of power generated for industries using electric motors. We had done so, having regard to the higher ratio of actual availability of motor h.p. to additional electric power generated in each of the three years 1956-57 to 1958-59 and general agreement at the public inquiry in favour of raising the multiplier factor to 2 for a realistic estimate. In connection with the present inquiry our attention has been drawn to an estimate of demand of 3.2 million k.w. (4.3 million h.p.) in 1965-66 for motors up to 300 h.p. as approved by the Development Council. This is based on (a) addition to the generating capacity during that year (and the average rate of increase during subsequent years of the Fourth Plan period) as 2.3 million k.w., (b) a load factor of 40 per cent, and (c) availability of 45 per cent of generated power for industries where electric motors are used. The actual figure of demand for motors on the basis of 2.3 million k.w. as the additional generating capacity and the above factors, however, works out to 2.5 million k.w. or 3.4 million h.p. The estimate of the

Development Council is based on the revised target of additional generating capacity during the Third Plan period of 7.4 million k.w., as against the original estimate of 6 million k.w. for the same period, on which the Development Council had made its earlier estimates of demand for h.p. requirements of electric motors as follows: 1.6 million h.p. in 1962-63; 2 million in 1963-64; 2.2 million in 1964-65; and 2.5 million in 1965-66. These figures despite the revision and projected increase in electricity generation during the Third Plan period have been endorsed by the Indian Electrical Manufacturers' Association.

7.2. The actual availability of motors during the years 1960, 1961 and 1962 was as follows:—

(In h.p.)

Year	Production of Motors		Imports	Total availability
	Large scale	Small scale		
1960	740,648	62,796	159,509	962,953
1961	854,641	66,318	168,377	1,089,336
1962	972,138	87,780	114,312	1,174,230

Over these three years the additional electric power generated was of the order of 1.76 million k.w. and the total h.p. of electric motors available was 3.33 million, which indicates that the multiplier factor has continued at the level of 2 as last estimated on the basis of actuals.

7.3. In this context the future requirements of additional h.p. for electric motors were discussed at the public inquiry. The Development Council's formula about load factor and a reduced consumption of power for electric motors from 50 to 45 per cent was generally accepted. In regard to the additional generating capacity for the future, however, we have been furnished with the latest figures of power generation by the Central Water and Power Commission as follows: 1962-63—0.54 million k.w., 1963-64—1.03 million k.w., 1964-65—1.90 million k.w., 1965-66—3.39 million k.w. This shows a very substantial shortfall in the earlier years which is expected to be made good by a steep increase in the figure of power generation in 1965-66. While for a realistic estimate due allowance has to be made for the sudden rise in 1965-66 against the previous year's figure of the Central Water and Power Commission, the Development Council's estimate of h.p. requirements of electric motors for that year would still appear to be on the low side for reasons already stated due to which the multiplier factor has to be raised to the level of 2. A probable contributory factor for this is the rising replacement demand together with conversions of group drives to individual drives. Further the estimate has to be stepped up to cover the requirements of motors of more than 300 h.p. In all circumstances, we consider that in estimating the requirements of 1965-66 due weightage should be given to the figures furnished by the Central Water and Power Commission and it would be more realistic to take effective generation of power in that year for the purpose of determining the demand for electric motors at 2.5 million k.w., being approximately the average of the two years 1964-65 and 1965-66. Taking 2 as the multiplier factor we have therefore estimated the h.p. requirements of electric motors in 1965-66 at 5 million h.p. For the year 1963-64 our estimate based on anticipated addition to the power generating capacity and the multiplier factor 2 is 2 million h.p. We place the estimate of demand for 1964-65 midway at 3.5 million h.p.

7.4. In paragraph 6.1 we have indicated the potential capacity of the large scale sector, inclusive of additional capacity licensed at 2,644,660 h.p. This together with the capacity of 100,000 h.p. in the small scale sector would provide for a total of 2,744,660 h.p. or say, 2.7 million h.p. for the entire industry for meeting future requirements. The position in this respect has manifestly changed since our last inquiry when we observed that the industry appeared to be capable of meeting the requirements of the country, as then envisaged, if it worked double shift. We have been informed now that despite more units in the large scale sector working double shift their production during 1962 has been less than 1 million h.p. against the total installed capacity of 1,136,040 h.p. The Indian Electrical Manufacturers' Association has observed that the existing units with their plans for expansion and development will be able to meet the Third Plan requirements. This conclusion of the Association based on its estimates of annual demand for motors up to 300 h.p. does not appear to us to be acceptable. According to the Development Council's estimate for the same range of motors, as taken into account by the Association, the total requirement of h.p. for 1965-66 would be of the order of 3.4 million. This indicates a large gap between the estimated installed capacity of 2.7 million h.p. (inclusive of additional licensed capacity—a major portion of the capacity already installed being worked on double shift) and the estimated demand for 1965-66. We, therefore, recommend that Government, in order to avoid any possible deficiency in production *vis-a-vis* the rising trend of demand during the next few years, should see to expeditious installation of the capacity already licensed and assist in future expansion of double shift working in all suitable units by ensuring adequate supply and proper utilisation of raw materials. If on a reassessment of the position, these measures are found inadequate for stepping up the production to the required level of demand timely action should be taken for licensing of additional capacity if necessary.

7.5. We have received a suggestion from the Indian Electrical Manufacturers' Association to examine the possibility of determining a break-up of the estimated demand of different rating of motors in h.p. ranges so that capacities in production units are built up accordingly. It has stated that as plant and machinery required for the manufacture of motors up to 10 h.p. are different from those required for the manufacture of motors up to 100 h.p. a break-up of the estimated demand would be helpful for creation of suitable capacities for meeting diverse needs in an effective manner. The Association has also informed us that the Central Statistical Organisation has agreed to its suggestion for publishing the production figures in h.p. ranges in the

'Monthly Statistics of Production of the Selected Industries in India'. The Association has also urged that if on a break-up of the demand it is found that there is shortage of production in any particular size the existing large units should be encouraged to manufacture that size or that type of motor instead of fresh licences being granted to others for the purpose. Such a scheme would better help balancing of the manufacturing potential of the country and also assist in reduction in cost due to the larger volume of production. While we appreciate the usefulness of the information sought by the Association, the preparation of any precise estimates of the demand for electric motors category-wise and according to their break-up in h.p. does not appear in the light of information available to us to be a practical proposition particularly in view of the multifarious demand of industries both existing and potential in their varied stages of development and planning. We were informed by the representative of D.T.D. at the public inquiry that although the licences did not specify any limit to the size and horse-power of motors to be manufactured by individual producers within the total horse-power of their licences, the Department gave necessary advice and instructions in connection therewith for guiding their manufacturing programme. In fact we have noticed that producers at present have been continuously enabled to enlarge the scope of manufacture including higher h.p. motors. Since all this involves a reorientation of the licensing policy and offer of guidance to the existing and prospective producers, we invite the attention of the D.T.D. to the above suggestion of the Indian Electrical Manufacturers' Association for due consideration.

Raw materials.

8.1. The principal raw materials required by the electric motors industry are given below:—

1. Electric sheet steel (dynamo grade)/stampings	For stator and rotor cores.
2. (a) Synthetic enamel copper wires . .	For stator winding in sq. cage motors and stator and rotor windings for slip ring motors.
(b) Copper strips and cast rings . .	For rotor of sq. cage motors.
(c) Aluminium ingots	For rotor cage for sq. cage motors when these are aluminium die cast.
3. Insulating materials and varnishes . .	For insulation of slots, overhang and leads and impregnation of windings.
4. Foundry grade pig iron	For body and shields and bearing and terminal covers etc.
5. Steel rods and bars	For shaft, key and eyebolt etc.

8.2. Other items required are components like ball or roller bearings, nuts, bolts, terminal lugs, terminal boards, slip ring assembly, brush holders, brushes and miscellaneous items like brazing alloy rods used for brazing copper strips with copper rings in squirrel cage motors and paints and thinners.

8.3. According to information furnished by the producers it appears that the cost of raw materials now ranges from 71 per cent to 84 per cent of the ex-works cost of a motor, and the indigenous content thereof accounts generally for over 90 per cent.

8.4. The position regarding each of the main items is examined as it is in their improvement in availability and lowering of costs that the progress of the electric motor industry lies.

8.4.1. *Electric sheet-steel/stampings:*

8.4.1.1. Tata Iron and Steel Co. (TISCO) continues to be the only producer of dynamo grade sheet steel used for motor stampings. During recent years small quantities, 2,000 to 3,000 tonnes a year, have been imported to supplement the indigenous supply. TISCO's present annual capacity for these sheets is about 24,000 tonnes per year. Its sales which may be taken as more or less equivalent to its production had amounted to 15,077 tonnes in 1960, 16,698 tonnes in 1961 and 22,423 tonnes in 1962. It has plans to expand its capacity to 42,000 tonnes; but we were informed by its representative at the public inquiry that it has yet to arrange for D.L.F. loan and it would take 1½ to 2 years after the availability of loan to augment its capacity. Except for 240 tonnes supplied to Jay Engineering Works in 1960 and 884 tonnes supplied to Devidayal in 1962, its entire production has been sold to Sankey Electrical Stampings Ltd. The prices charged by TISCO have varied during the last three years and the increases are reported to be due to the levy or revision of excise duty. As compared to February, 1960, the prices of its sheets in August, 1962 stood higher by about Rs. 100 per tonne.

8.4.1.2. We have been informed by Hindustan Steel that in its 1.8 million tonne expansion programme at Rourkela, provision has been made for producing electric sheet steel to the extent of 50,000 tonnes of which about half will be of dynamo grade. The production of these sheets is expected to commence in April, 1966. Thus both in the case of TISCO as well as Hindustan Steel the anticipated capacities are unlikely to materialise till the beginning of 1966. Dynamo grade sheet steel in addition to its being used for manufacture of motor stampings is also used for stampings for fans, chokes, etc. Separate figures for the use of sheet steel for motors and for other uses are not available. The total quantity as supplied by TISCO and imported by Sankeys along with corresponding production of electric motors in h.p. and the ratio of sheet steel available in tonnes corresponding to one million h.p. of motors production from years 1960 to 1962 are given below:—

Year	Total indigenous production of motors in h.p.	Total availability of sheet steel (tonnes)	Sheet steel available in tonnes per million h.p. of motors production
1960	803,444	16,786	20,892
1961	920,959	19,878	21,584
1962	1,059,918	24,238	22,868

Small imports have also been made directly by motor producers but their exact figures are not available. It is expected that the demand for fans, chokes, etc. which is also related to additional power available, estimated by us at about 50 per cent of the demand for electric motors at the time of the last inquiry, will keep pace with the demand of electric motors, and on a conservative basis about 20,000 tonnes of sheet steel of dynamo grade will be required corresponding to one million h.p. of production of electric motors. On the basis of the estimated demand (see paragraph 7), the overall requirements of electric sheet steel for the years 1963, 1964 and 1965 would be of the order of 40,000, 70,000 and 100,000 tonnes respectively (inclusive of requirements for fans, chokes, etc.). If the capacity of TISCO remains at 24,000 tonnes per annum, the shortfall in the supply of sheet steel of this grade will amount to 16,000 tonnes, 46,000 tonnes and 76,000 tonnes in 1963, 1964 and 1965 respectively and will entail a considerable drain on the foreign exchange resources if the deficiency is to be met by imports. The Department of Technical Development has estimated the requirement of sheet steel for motors to increase only to about 40,000 tonnes in 1965-66 based on its lower target of demand for motors as discussed in paragraph 7. The Indian Electrical Manufacturers' Association has anticipated a shortfall of about 25,000 tonnes for 1965-66 after taking into account TISCO's capacity and has pointed out that the shortfall will have to be made good by setting up indigenous manufacturing capacity or by imports. In view of the large gap between indigenous production and demand for electric sheet steel envisaged in the coming years we consider it desirable that steps are taken by TISCO to expedite the installation of its additional capacity and Government should afford the necessary facilities to it in this direction. Hindustan Steel should also explore the possibility of manufacturing dynamo grade sheet steel before April, 1966 by any feasible adjustments in its production programme. Any advancement in the date of production of these sheets will mean saving of foreign exchange to that extent and at the same time would ensure adequacy of the supply of the material required by the industry to meet its future requirements.

8.4.1.3. Some manufacturers of electric motors meet a part of their requirements of stampings from their own production. For the rest of their requirements these and other producers depend on Sankey Electrical Stampings Ltd., and Devidayal Stainless Steel Industries (P) Ltd. Jay Engineering Works is also stated to be producing stampings but these are mainly for fans and for its own use. The present supply position and production potential of the two units are briefly indicated below: —

8.4.1.4. *Sankey Electrical Stampings Ltd.*—It continues to be the biggest supplier of stampings to the electric motor industry. Its licensed capacity is 25,000 tonnes a year but its present installed capacity at its three factories at Bombay, Calcutta and Bangalore for the production of motor stampings is only 7,070 tonnes. If the capacity for stampings for chokes and fans is taken into account it adds up to 9,920 tonnes on double shift. It has plans to expand its capacity for motor stampings to 10,000 tonnes by 1964-65 and orders for the machinery have been placed by it. Sankey has stated that at present its factories are working below capacity, operating on single shift with intermittent double shift, and in order to improve its plant utilisation, it has accepted orders for manufacture of machinery components from textile and automobile industries, etc. The quantity of steel received by Sankey from TISCO, its own imports and its sales of sheets as TISCO's distributors and the balance available to it for manufacture of stampings are given below:—

(In tonnes)

Year	From TISCO	Imported	Total	Sales	Balance available
1960 . . .	14,710	1,709	16,419	1,957	14,462
1961 . . .	16,327	3,180	19,507	3,065	16,442
1962 . . .	21,222	1,815	23,037	4,032	18,955

The prices for imported sheets were higher as compared to the indigenous sheets. The average waste per tonne of stampings was indicated as 1.40 tonnes in 1960, 1.36 tonnes in 1961 and 1.31 tonnes in 1962. The trend is satisfactory and can be further improved. Motor stampings up to 18″ diameter are included in its list prices and the prices for bigger size stampings are negotiated. Sankey allows a quantity rebate varying from 1 to 7½ per cent and a standardisation rebate varying from 1 to 2 per cent. The selling prices of motor stampings were reduced in the beginning of 1959 and in 1962. It has stated that as against the increase in raw material cost by about Rs. 100 per tonne, entailing an increase of 27 nP. per kg. of stampings, the actual increase in selling price has been only 4 nP. per kg. for standard stampings (9″ to 12″). This, according to Sankey, has been possible mainly due to the decrease in waste percentage achieved by it. It has stated that the incentive scheme of standardisation rebates in operation since 1961 has not induced many motor manufacturers to standardise their requirements of stampings with the result that it has not been possible for it to reduce tool costs.

8.4.1.5. *Devidayal Stainless Steel Industries Private Ltd.*—It has a licensed capacity of 6,000 tonnes of which it has so far installed 4,500 tonnes on double shift. About 60 per cent of this capacity *i.e.*, about 2,700 tonnes will be for motor stampings. Its production of stampings during 1961 was 28 tonnes and in 1962 it was 145 tonnes. Stampings up to diameter of 12″ were produced but it has plans to make bigger diameter stampings for which it will require further accessories and it has applied for import licences.

8.4.1.6. The total sales of motors stampings by Sankey and Devidayal were 4,136 tonnes in 1960, 4,426 tonnes in 1961 and 4,798 tonnes in 1962. Devidayal's share in the sales was 2 tonnes in 1961 and 118 tonnes in 1962. The main supplies were thus made by Sankey whose sales to the organised sector were 83 per cent in 1960, 79 per cent in 1961 and 85 per cent in 1962. The present combined licensed capacity of the two producers of stampings is about 28,600 tonnes (Sankey 25,000 tonnes and Devidayal 3,600 tonnes) which includes stampings for fans, chokes, etc. However, the installed capacity at present is much below the licensed capacity and amounts to 14,420 tonnes (Sankey 9,920 tonnes and Devidayal 4,500 tonnes). The installed capacity of the two for motor stampings alone is less than 10,000 tonnes which on the completion of Sankey's expansion scheme under implementation will increase to 12,700 tonnes. So far we have not received complaints regarding the availability of motor stampings. However, in view of the steep rise in the demand for motors expected from 1964 onwards serious shortages are likely to develop unless steps are taken well in advance to expedite installation of further capacity for the manufacture of stampings. We were informed by Sankey's representative at the public inquiry that according to the latest pattern of production of electric motors for every million of h.p. as much as 5,000 tonnes of stampings were required, which indicates a total requirement of 25,000 tonnes in 1965-66. We recommend, therefore, that Government should give the requisite facilities, with higher priority either to the existing producers of stampings or to the manufacturers of motors whose own requirements are sizeable to increase the total installed capacity to a commensurate level, as this would involve a saving for capital equipment required for fresh units and facilitate optimum utilisation of the existing capacity.

8.4.2. *Enamelled copper wires.*—We have been furnished with the names of more than 15 units manufacturing synthetic enamelled copper wires at present. Some of them also manufacture cotton and paper covered wires as well as enamelled wires for fans etc. Since information from all the units is not complete and the wires produced by the industry are used for other items also such as fans, transformers, etc., the figures of their total capacity and production of enamelled wires for the electric motor industry only are not available. The Department of Technical Development has informed us that these are being manufactured in adequate quantities in the country and the industry's requirement is at present being almost exclusively met from indigenous production. It has further stated that the current demand for these wires for motors is of the order of 3,000 tonnes which is estimated to rise to about 12,000 tonnes by 1965-66 and that in keeping with this demand capacity is being created for the manufacture of various types of wires.

8.4.2.1. The Indian Electrical Manufacturers' Association has stated that the output of the wire manufacturers is limited by the availability of copper and it is of the opinion that copper quota to these units needs to be increased. No serious complaints were made at the public inquiry regarding overall shortage of enamelled wires, but there were complaints regarding shortage of certain sizes of wires mainly required for bigger sizes of motors, namely, 13 to 18 SWG (0.092 to 0.1″ conductor diameter for 13 gauge to 0.048 to 0.054″ conductor diameter for 18 gauge). Short supply of these sizes was admitted by the producers of enamelled wires who attributed this to the shortage of copper which compelled them to produce sizes affording fuller utilisation of wire drawing capacity. It was, however, pointed out to us that the shortage was mainly due to the producers' preference for manufacturing thinner gauges where the profit margins are higher. Since the industry's effort to produce motors of bigger and larger h.p. is a welcome feature it needs to be encouraged by ensuring easier availability of its raw material requirements. We suggest that the Department of Technical Development should examine this matter and direct the required modification in the pattern of production following up, if necessary, by larger allocation of copper. Complaints were also received by us regarding the shortage of wires of metric sizes, but we understand that the production of metric sizes is being progressively increased. The consensus of opinion was that the quality of enamelled wires produced in the country was satisfactory but there was scope for further improvement.

8.4.2.2. In view of the doubts expressed by some producers of electric motors regarding the suitability of indigenous enamelled copper wires for class 'E' insulation, the wire manufacturers were asked to state whether their products were suitable for winding of motors rated according to the class 'E' insulation. All the producers of wires who replied to our questionnaire, namely, Indian Cable Co., Calcutta, Hindustan Transmission Products, Bombay, National Insulated Cable Co., Calcutta, Hindustan Wire Products, Patiala and Shakti Insulated Wires, Bombay, have stated that their products are suitable for class 'E' insulation and that the industry is already using these wires generally termed as super enamel wires. Specifications normally followed by producers of wire are BSS 1844:1961, IS 1595:1960 and BSS 3160: 1959. These specifications do not lay down the suitability of wires for any particular class of insulation. The first two specifications specify heat shock and aging tests for 130° ±2°C for heat shock and 180° ± 2°C for heat aging tests. The manufacturers of the enamelled copper wires claim that they are able to meet the first two specifications whereas in some cases they are not able to meet the requirements of heat shock and aging tests laid down by BSS:3160. The matter was discussed in detail at the public inquiry. The discussions indicated that it is not essential for the manufacturers of electric motors to insist on heat shock and aging tests beyond the first two specifications which would cover the requirements for the winding of motors with class 'E' insulation. The representative of the Department of Technical Development also expressed agreement with this view. It was mentioned by one of the representatives of the producers that no heat aging test has been carried out in indigenous enamelled wires. The evidence is, however, to the contrary as we find from copies of test reports issued by the Government Test House, Alipore, to some of the producers that their products were considered satisfactory against heat aging test. Some of the wire producers have claimed that even higher temperature tests can be met by their products. Hindustan Transmission Products has indicated that it manufactures wires suitable also for class 'B' insulation which has to stand a higher temperature. National Insulated Cable Co. has pointed out that heat shock tests on its wires are carried out for 160° ± 2°C. Hindustan Wire Products and Shakti Insulated Wires Pvt. Ltd. have enclosed test certificates from Government Test House, Alipore, certifying that the wires were found satisfactory (including heat shock tests) for class 'E' insulation.

8.4.2.3. The electric motor manufacturers were also asked about the suitability of indigenous enamelled wire for class 'E' insulation. Associated Electrical Industries, Calcutta, General Electric Co. of India (Mfg.), Calcutta, and Motor and Machinery Manufacturers, Calcutta, have stated that the wires produced in the country are suitable and satisfactory for the winding of motors with class 'E' insulation. One of the producers, namely, Bharat Bijlee had sent over the samples of indigenous wires to its collaborators, namely, Siemens of West Germany and the wires were approved for use in motors with class 'E' insulation. It has been using these wires for its class 'E' motors for some time without having received any complaints. Kirloskar and Jyoti have, however, stated that the wires manufactured in the country need considerable improvement in quality before they are fully accepted for use in class 'E' motors. Kirloskar had also stated that the quality of wire differs from batch to batch. It was however admitted by its representative that the observations were based mainly on the initial supply of some of the producers and the quality had since then improved. The evidence placed before us showed that the quality of indigenous enamelled wire did not stand in the way of motor manufacturers switching over to class 'E' insulation for at least a substantial part of their production. Other relevant aspects of the problem are discussed in paragraph 9.

8.4.3. *Copper strips, cast rings and aluminium ingots for rotor castings.*—Copper strips and cast rings are processed indigenously from imported electrolytic copper. Except for a portion of its requirement the country will continue to depend on imports of copper. In the case of aluminium die-cast rotors indigenous aluminium which is now more freely available is being used. In spite of the resultant saving of foreign exchange and obvious economies in the cost of production of aluminium die-cast rotors and our recommendation that the industry should be encouraged to switch over to it, as indicated in paragraph 4.2, the progress made by the industry in the use of aluminium cast rotors has not been satisfactory.

8.4.4. *Insulation material.*—Insulation of electric motor consists of and the classification of its insulation depends on (a) the quality and specifications of the enamelled copper wires, (b) impregnating varnish, and (c) the insulation material for slot and intercoil, leads, terminals, etc. Insulating impregnating varnishes are available indigenously and their quality is stated to be fully satisfactory and suitable for meeting the requirement of class 'E' insulation. The slot and intercoil insulation comprises leatheroid and other paper based materials, empire cloth, sleevings, tapes, etc. The bulk of the main item, namely, leatheroid and other paper based insulating material is still being imported. Other items are available indigenously. Leatheroid of either slightly greater thickness or lined with polyester foil is stated to be used for class 'E' insulation. Some of the producers of electric motors have put forward the non-availability of suitable insulation material for slot and intercoil as one of the reasons for their inability to produce motors of class 'E' insulation. We had taken note of this and should like reiterate the view expressed in our last Report (1961) which we consider to be quite relevant in the present context also: "As the industry is in any case importing most of its requirements of slot and intercoil insulating material at present, the lack of indigenous availability of such insulating material should not stand in the way of changing over to class 'E' insulation and the incidence of its higher cost would be negligible. Further, with the progressive use of class 'E' insulation, it will be natural to assume that the class of material available and to be developed in the country would also be suitable for this class of insulation." From the costed units we have observed that the incidence of the insulating materials where the total material cost was higher varied from 1.1 to 3.8 per cent and could be assumed to average about 2.5 per cent of the cost of motor. Even if these materials were 60 per cent more expensive as stated by some of the representatives of motor manufacturers, the total incidence of this extra cost, keeping in view the reduced quantities required, may not exceed 1 per cent against a total saving in the raw materials and other costs which would be much more substantial.

8.4.5. *Pig iron.*—The producers and the Indian Electrical Manufacturers' Association have reported acute shortage of pig iron and non-availability of the required grades. We have been informed by the Iron & Steel Controller that the supply position of pig iron has considerably worsened since the last inquiry due to the large gap between the demand and supply of pig iron. Till such time that there is improvement in the overall supply position we suggest that a special priority may be accorded to the electric motor industry as its products constitute an important item of capital equipment and has assumed greater significance for speeding up the industrialisation of the country. We have been informed that in overseas countries a noticeable trend has been the use of bodies of motors fabricated from mild steel sheets or pressure die-cast from aluminium alloy. Reduction of frame size and weight could add up to the other economies derived from die-cast motors in 'E' type insulation. If these substitute materials offer prospects of easier availability it may be worth-while for the indigenous industry also to experiment on these lines. We are informed by a small unit that there is awareness of the advantages of lighter weight motors and it is ready to meet competition in foreign markets in range of smaller motors if this facility is made available.

8.4.6. *Steel rods and bars.*—For shafts of motors the industry has to depend mainly on imports of these items whose supply position is stated to be irregular and considerably short of requirements. Complaints regarding bad quality and high prices of steel rods and bars have also been received by us. Some of the producers and the Indian

Electrical Manufacturers' Association have suggested liberalisation of imports. We bring these complaints to the notice of Government for an assessment of the industry's present and future demands and for laying down a programme to meet their requirement adequately either from indigenous sources or from imports.

8.4.7. *Ball bearings.*—For large size ball bearings and for roller bearings also the industry is dependent on imports. The prices are reported to be high and the deliveries long. Some of the producers have further complained about difficulties in locating the required sizes for import under D.L.F. We bring this to the notice of Government for due consideration. Complaints regarding the high prices and the inferior quality of indigenous bearings also persist. In our Report on Ball Bearings Industry (1962) we have brought the various complaints of consumers to the notice of the manufacturers of bearings and impressed upon them the need for improving the quality of their products the more so as these are used as industrial components. We have also mentioned that substantial additional capacity for the manufacture of ball and roller bearings is being implemented and that it is expected to bring about a general improvement in the supply position.

Special problems of the industry.

9.1. The issues considered in the previous paragraph about raw material costs and consumption by the industry, as determined by its current production techniques, hold the key to its special problems and affect the cost of production of electric motors. Incidentally, the export prospects of the industry are closely tied up with it. Many of the producers have drawn our attention to the high cost of bare raw materials and represented that even this is higher than the cost of motors which overseas producers are able to sell. At the same time they have referred to the compact designs of the motors offered by foreign producers. Most of the raw materials needed by the industry are at present available indigenously. Only a small part of the wide disparity of prices of indigenous and foreign motors can be explained by the higher prices of indigenous raw materials. The real explanation to this disparity appears to be the improved and compact design practices of overseas producers involving more economical use of raw materials. Our conclusion in this respect is confirmed by an examination of the relevant data pertaining to the products of several overseas producers and one of the well-known continental manufacturers of electric motors, namely, ASEA (of Sweden) whose weights of various h.p. motors are found to be very low. They are shown in a table in Appendix VII along with the weights of indigenous motors for a comparative study. The table shows that the indigenous motors are conspicuously heavier than ASEA's products varying from about 58 per cent for a 7.5 h.p. motor to 269 per cent for a 1 h.p. motor. The distinctive aspects of ASEA'S products to which the difference is mainly attributable are as follows: ASEA motors are rated according to class 'E' insulation and with 75°C temperature rise over 40°C ambient air temperature, against 50°C temperature rise allowed for class 'A' insulation in the case of the indigenous product (temperature rise allowed by BSS and ISS is 65°C and 50°C over the same ambient air temperature for class 'E' and 'A' insulations respectively). ASEA uses die-cast aluminium rotors and fabricated steel bodies or bodies made from pressure die-cast aluminium alloys. These factors in their bearing on the indigenous industry call for a careful assessment from the point of view of conservation of foreign exchange, better utilisation of raw materials so as to increase output within the present overall availability of raw material and reduction of the costs of production.

9.2. *Change-over to class 'E' insulation.*—We had asked the producers at the public inquiry to give an indication of the extent of saving in cost of production likely to accrue from a change-over to class 'E' insulation but no clarification could be got from them. Bharat Bijlee which has commenced production of motors with class 'E' insulation for a few of the sizes produced by it however stated that it has reduced its prices by 7½ per cent; but this could not be regarded as an indication of the extent of cost reduction. The representative of the unit agreed that with a widening of the range of manufacture with class 'E' insulation and adoption of suitable frame sizes the economies for a given h.p. rating will be more substantial. A realistic assessment of the economies with class 'E' insulation can be had from comparing the outputs specified by IS: 1231—1962 for class 'E' insulation and those specified against the same frame sizes if rated for class 'A' insulation. The extent of advantages by changing over to class 'E' insulation rating will be reflected in the increase in horse power output for the *same* frame size (representing a certain quantum of material and conversion cost), which ranges from 100 per cent rise of the output for a 1.5 h.p. class 'A' motor to 20 to 25 per cent increase for 25 h.p. motor. Alternatively it can be gauged from the reduction in size which will involve less material cost for a motor of given h.p. if rated according to class 'E' insulation. This reduction in size as an indication of economy averages about 30 per cent. The above comparison thus gives a realistic idea of the possible savings. These figures of comparative output, percentage increase in output based on IS: 1231—1962 covering frame sizes of 'E' class motors up to 30 h.p. (which cover the bulk of indigenous production) are given in Appendix VIII. A similar study of comparative outputs for class 'A' and 'E' insulation for different frame sizes according to BSS 2960 (for which the temperature rise conditions are the same as for IS: 325—1961) revealed similar economies. The change-over would not call for any capital investment and there would be no extra cost to be incurred for any of the raw materials except slot and material insulations and sleevings which, as mentioned earlier in paragraph 8.4.4 will also be insignificant (amounting to about one per cent). The implications of the overall substantial savings on raw materials are obvious.

9.3. The real savings have a wider impact than the cost of motors. We have discussed in paragraph 8 the serious shortage of important raw materials including dynamo grade sheet steel copper wires, pig iron and shaft steel. Imports of copper necessarily involves a continuous strain on foreign exchange resources and unless the industry voluntarily takes steps to economise on its use other steps may be called for. The industry stands confronted with grim prospects of shortage not only in respect of this metal but also dynamo grade sheet steel which may from indigenous sources run short of growing demand. Even in the case of pig iron for which the demand is estimated to be 2 million tonnes against a production of 1.1 million tonnes, imports are being considered by Government as a step compelled by exigencies of current difficult conditions. The performance of the industry and the delay on its part to change over to class 'E' insulation in spite of our recommendation to this effect more than two years back has therefore to be viewed in the context of these considerations. The points raised by some of the producers regarding the difficulties have been discussed earlier in paragraph 8. Their plea of consumer resistance has also been found by us to be equally unconvincing. In reply to our questionnaire most of the consumers have indicated that they have no basic objection to motors with class 'E' insulation. Others have stated that since they have not been offered such motors they are not in a position to comment. The Millowners' Association had earlier mentioned that indigenous motors are too bulky and further that its members are in favour of accepting these motors on experimental basis. The representative of the Association expressed doubt at the public inquiry that since motors of class 'E' insulation would dissipate more heat it would increase the load on their air-conditioning and humidifying equipment. It was, however, pointed out to him that the total quantity of heat given out by the motors of class 'E' insulation would not be more and might in fact be less; only its dissipation is at a higher temperature which would not adversely affect the working of the plant. The reluctant attitude of cotton mills, one of the largest consumers, is attributable to their predilections in favour of past practice. The non-acceptance of motors with higher temperature rise by the Insurance Association of India for use in ring frames, etc., although such motors are accepted in the textile industry in other countries which was mentioned by the mill representatives is perhaps likewise a case of adherence to tradition rather than based on any special study. Since such modernised equipment is accepted in Western countries we would suggest that Government should ask insurers to adopt a more progressive and helpful attitude. We had carefully gone through this and other aspects of the problem even at the time of the last inquiry when we recommended that the producers of electric motors should expedite measures to switch-over to class 'E' insulation without further delay. We would like to reiterate this recommendation and suggest that having regard to the avoidable strain on foreign exchange and the wasteful use of scarce raw materials resulting from the present manufacturing practices of the producers, Government should take steps for regulating allocation of raw materials to the industry in a manner that will ensure their most economical and fullest possible utilisation with the adoption of class 'E' insulation for all approved uses and lay down a phased but definite programme for the industry for the change over in the shortest possible time.

9.3.1. *Aluminium die-cast rotors.*—In paragraph 4.3 we have indicated the progress made by the various units of the industry in changing over to aluminium die-cast rotors in response to the recommendation in our last Report (1961). We have also observed that progress made so far is not satisfactory. Besides the important consideration of avoiding or reducing the expenditure of foreign exchange on imports of copper through its replacement by aluminium now indigenously available the adoption of such rotors has also a special significance for reducing cost. The saving both in respect of foreign exchange and the cost of production would thus be quite substantial. There is some capital cost involved in the change over but we are advised that the cost of dies and other equipment would be more or less offset by lower labour costs compared to rotors with copper strips and rings. It is disappointing to note that despite such important economic considerations a number of producers even in the organised sector have not taken adequate steps for a change over to aluminium die-cast rotors. We recommend that, as in the case of the cable industry, Government should set an early date as target for the industry to change over to aluminium die-cast rotors for motors (squirrel cage) progressively up to 30 h.p. Government should, however, give necessary facilities to the industry to enable it to acquire the requisite equipment and dies for this purpose.

9.3.2. With regard to the small scale sector, we have been informed by the Development Commissioner that in view of the size of investment required the industry has not been able to change over to aluminium die-cast rotors. At the public inquiry we were informed by the representative of a large producer using gravity die-cast that such casting involving simpler equipment and small outlay could be suitably adopted by the small scale sector with necessary tool room facilities. The cost of dies may be somewhat high but it would be possible to recover the cost in a short time with the substantial saving accruing from the adoption of the method of casting particularly as the smaller units normally concentrate on fewer sizes. We bring this to the notice of the Development Commissioner for a detailed investigation of the feasibility of initiating such a scheme. We have also observed that the units of the small sector are largely concentrated in a few areas like Coimbatore in Madras, Jullundur and Amritsar in Punjab, and the cities of Delhi and Bombay. It would be worthwhile to investigate possibilities of developing the manufacture of aluminium die-cast rotors in these places through co-operative organisations of the units with the guidance and assistance of Small Industries Service Institutes. This could be done either on the basis of dies being supplied by the centre for standardised rotors against specific charges or the dies being provided by the units themselves. Such a scheme would be of valuable service to the small scale units which are handicapped at present by lack of adequate testing equipment, specially dynamic balancing machine for balancing of rotors. The centralised facilities could make up this deficiency by including installation of such and other expensive testing equipment. We suggest that Government should undertake an examination of the possibility of establishing such centralized services in suitable areas as early as possible with a view to bringing the economic advantages of aluminium die-cast rotors within the reach of small scale units.

We were informed at the public inquiry that Sankey Electrical Stampings has a plan to set up aluminium die-casting equipment and in fact has imported one machine for rotors up to 4″ diameter. Its implementation is however held up due to foreign exchange considerations. As the plan would simultaneously help standardisation and supply of aluminium cast rotors duly tested and balanced particularly to small scale units, we commend it to Government for their consideration.

9.4. *Fabricated mild steel/aluminium pressure die-cast bodies.*—As previously stated the overseas producers in order to make more compact and lighter motors have been making greater use of either fabricated mild sheet steel or aluminium die-cast bodies. ASEA whose weights of motors have been compared in Appendix VII manufactures these series of motors from aluminium alloy. Under paragraph 8.4 while discussing the acute shortage of pig iron we have drawn the attention of the indigenous industry to the advisability of undertaking experiments on similar lines. For frame sizes whose production is possible on mass scale such a substitution may even help to bring down the costs particularly for the export markets.

10.1. *Standard specifications:*

Standards and quality

10.1.1. The Indian Standards Institution has informed us that since our last inquiry IS:325-1959 has been revised in 1961 to include motors with class 'E' insulation, additional types of ratings, preferred output ratings up to 250 k.w. and requirement for balancing of motors. The temperature rises allowed of classes 'A', 'E' and 'B' insulation are in line with the BSS and 10°C lower than the corresponding figures given by the German Specifications. Secondly, IS:1231-1958 has been revised in 1962 to include dimensions of class 'E' insulation motors for totally enclosed types and thirdly, action has been taken for the publication of IS:2223-1962 on dimensions of flange motors. In addition a revision of IS:996-1959 pertaining to specifications for small AC and universal electric motors with class 'A' insulation on the lines of IS:325-1961 and a standard on dimensions of vertical motors are also in the offing, the draft of the latter being already under circulation. We were informed at the public inquiry that the preparation of specifications for loom motors is also due to be undertaken shortly.

10.1.2. At the time of the last inquiry five large-scale and four small-scale units were using ISI certification mark relating to IS:325-1959. The manufacturers of motors were reluctant to adopt the marking scheme on the plea of high fee charged by the ISI. We are informed that the ISI has since made substantial reductions in its marking fee and has offered the Indian Electrical Manufacturers' Association certain special incentive rates on a sliding scale for the large-scale manufacturers. At present there are 18 units of medium and small sizes holding licence to use IS:325-1961 and/or IS:996-1959. There are also 16 applications under consideration. The ISI has stated that there is some organised resistance among the large scale manufacturers to participate in the Marking Scheme in spite of its meeting the objection regarding the high rate of marking fee.

10.1.3. In this connection the Indian Electrical Manufacturers' Association has represented that it is the considered view of the Association that capital goods like motors always purchased by qualified engineers need not have the ISI mark as on consumer goods brought by general lay public. Even so as a measure of co-operation the Association had advised its members many of whom were in fact following the Indian Standards to join the scheme provided the I.S.I. put a ceiling on the fee to be paid by individual producers. The I.S.I. had not, however, agreed to a ceiling so far. In support of its proposal for a ceiling the Association has stated that the usual practice in Western countries is to levy a small fee to use the label issued by the certifying organisations. It has quoted the example of the British Electricals Approvals Board which charges (i) an application fee for initial test report, (ii) a fee for grant of certificate, and (iii) an annual fee for routine check test, only the third fee being payable annually for renewal of certificate. With progressively increasing use of rotor pumping sets used for rural irrigation and large number of motors used by small scale producers, we are not convinced about the distinctive character of electric motors as capital goods always purchased by qualified engineers which could be more relevant for high rating motors. The matter was discussed at the public inquiry and the evidence placed before us indicated that the producers were not opposed to the certification scheme on principle and it was only the payment involved which in their opinion stood in the way on account of its heavy incidence. Even this point appears to us to have lost much of its original force in the light of the latest revisions of rates, as previously stated, which indicate that the incidence of charges for the bigger producers would now be less than 0.05 per cent. In these circumstances and having regard to special benefits likely to accrue from widespread adoption of the certification scheme by way of ensuring quality standard and interchangeability of parts in the interest of economy we would ask the producers to approach the question afresh. We also suggest that I.S.I. may explore the possibility of any further reduction for the upper slabs in view of the growing output of the bigger units.

10.2. *Quality.*—The quality of indigenous motors which was found to be satisfactory at the time of the last inquiry has been fairly well maintained backed by testing facilities available with the producers and such outside institutions as the Government Test House, Calcutta, the National Physical Laboratory, Delhi and the Central Mining Research Station, Dhanbad etc. We are informed that the NPL having facilities for testing of three phase induction motors in the range of 1 to 5 h.p. in accordance with IS:325-1961 has tested some motors on behalf of the I.S.I. and that the Government Test House has facilities for testing motors of all categories rated up to 50 h.p. according to B.S. and I.S. specifications and its services have been availed of by 19 manufacturers in both the large-scale and small-scale sectors. The Central Mining Research Station which specialises in the testing of flame and explosion proofness of motors has facilities for testing motors up to 150-200 h.p. It has reported that it has plans for stepping up the h.p. to 1000 and establishing facilities for testing dust-proofness as a protection from explosion hazard from inflammable/explosive dust and that the tests already undertaken by it with its existing facilities for several producers have been found to be successful. We are informed by the Indian Electrical Manufacturers' Association that all the members in the Association are manufacturing motors either according to ISS or BSS and that it has not received any complaint regarding the quality of Indian motors. The Department of Technical Development has stated that the quality of the motors produced indigenously is comparable with standard motors produced abroad and that they conform to the recognised standard specifications. The D.G.S. & D. has also stated that indigenous motors of 3 phase AC induction types are of acceptable quality. Some of the important consumers like Tata Engineering & Locomotive Company Ltd., Controller of Stores, Northern Railway, Hindustan Aircraft, Chittaranjan Locomotive Works and Central India Machinery Manufacturing Co. Ltd., have reported that the quality of motors purchased by them is quite satisfactory for their purposes. Hindustan Machine Tools has, however, stated that it requires special quality motors to run precision machines and often the noise level and vibration have been excessive being due to bad quality ball bearings. We have received this and some other complaints from the Associated Cement Companies Ltd. in regard to squirrel cage induction motors above 50 h.p. and also from the Millowners' Association, Bombay about certain defects noticed by its constituents in the indigenous motors. Most of these pertain, in our opinion, to remediable defects and we have brought them to the notice of the producers at the public inquiry, and impressed on them the need for exercise of greater care in future for removing the cause for such complaints. As regards units in the small scale sector we are informed that they have been generally following the I.S. specifications. While in some cases they have obtained licence for I.S.I. certification marks, and have occasionally availed themselves of the facilities offered by institutions like Government Test House, Calcutta, in most cases they lack adequate testing facilities particularly the more expensive equipment such as for dynamic balancing of rotors, load and heat test, high voltage test etc. In paragraph 9.3.2 we have already suggested that Government should explore the possibility of setting up centralised facilities which should include the more expensive testing equipment and facilities for the production of aluminium die-cast rotors and balancing them before supply to the small units. Only through such co-operative efforts facilitating the establishment of centralised services and maintenance of rigid quality standard can the small scale sector discharge its responsibility of meeting its share of the rapidly increasing demand for electric motors.

11.1. Protected categories of electric motors and components parts thereof with the exception of control gear are assessed to duty under Item No. 72(14) of the First Schedule to the Indian Tariff Act, 1934. The relevant extract from the Schedule is given below:

Existing rates of duty

Item No.	Name of article	Nature of duty	Standard rate of duty	Preferential rate of duty if the article is the produce or manufacture of			Duration of protective rates of duty
				The United kingdom	A British Colony	Burma	
1	2	3	4	5	6	7	8
72(14)	(a) the following electric motors namely: (*i*) Squirrel cage induction motors and slip ring motors of a brake-horse-power not exceeding 500 but not less than one brake horse-power, excluding variable speed commutator motors.	Protective	15% *ad valorem.*	..	..	Free	December, 31st, 1963.
	(*ii*) Single phase motors of a brake-horse-power not exceeding 3 but not less than one brake-horse-power.	Protective	15% *ad valorem.*	..	..	..	December, 31st, 1963.
	(*iii*) Fractional h. p. motors of not less than one-quarter of one brake-horse-power.	Protective	15% *ad valorem.*	..	..	..	Do.
	(*iv*) Fractional h.p. motors of less than one-quarter of one brake-horse-power.	Do.	35% *ad valorem.*	..	..	..	Do.

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1	2	3	4	5	6	7	8
	(*b*) Component parts of electric motors as defined in sub-items (i), (ii) and (*iii*) of item 72 (14) (a) but excluding control gear for the same, provided that only such articles shall be deemed to be component parts as are essential for the working of the electric motors and have been given for that purpose some special shape or quality which would not be essential for their use for any other purpose.	Protective	20% *ad valorem.*	..	..	Free	December, 31st, 1963.
	(*c*) Component parts of electric motors as defined in sub-item (iv) of item 72(14) (a).	Protective	35% *ad valorem.*	..	..	..	December 31st, 1963.

NOTES.—1. Under Indian Finance Act, 1963, a surcharge of 10 per cent has been added on all import duties.

2. In addition to the above rates of protective duty, under Section 2A of the Indian Tariff Act, 1934, a countervailing duty equivalent to the current excise duty leviable on like articles produced or manufactured in India is levied on imported motors and parts thereof.

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11.2. The rates of excise duty leviable at present on electric motors and parts thereof under the Central Excise and Salt Act, 1944 are given in Appendix IX.

11.3. At the time of our last inquiry we had received complaints about the adverse repercussions of the tariff valuation and allied calculation of excise duty on the small scale sector *vis-a-vis* the large scale sector of the industry entailing a heavier incidence of burden on the former even though its costs might be lower. Since then the tariff values have been revised by Government of India, Ministry of Finance Notifications (No. G.S.R. 183, 184, 185 and 186 dated the 2nd February, 1963). The complaint about the disproportionately higher incidence of the excise duty on the small scale sector, particularly in respect of components manufactured and fractional horse power motors, was reiterated by some of its representatives at the public inquiry and they were advised to take up their case with the Ministry of Finance. The hardships mentioned relate to the taxing of rough finished components like die-cast rotors etc., the cumbersome formalities for production and sale by component manufacturers and the cumulative impact of duties on components as well as complete and finished motors.

Imports and import control policy.

12.1. In the following table are set forth the quantity and value of imports of electric motors (including fractional horse-power motors) during 1960, 1961 and 1962 as recorded in the 'Monthly Statistics of Foreign Trade of India':

Description	1960		1961		1962	
	No.	Value Rs.	No.	Value Rs.	No.	Value Rs.
1. A. C. Single phase motors	21,308	25,18,868	14,357	15,54,496	5,700	15,05,084
2. A. C. Squirrel cage induction motors 3 phase	3,301	85,19,765	3,848	90,53,724	1,958	82,76,784
3. A. C. Slip-ring motors.	401	22,78,181	589	29,54,247	473	32,30,028
4. D. C. Motors	2,958	55,31,650	2,233	72,03,540	2,535	35,10,694
5. Universal motors all types electric motors N.E.S., and other types of A. C. motors .	4,247	77,52,370	10,414	80,25,509	6,219	1,04,79,391
TOTAL .	32,215	2,66,00,834	31,441	2,87,91,516	16,885	2,70,01,981

Detailed statement showing the imports of electric motors during the above three years and the main countries of origin of the imports is given in Appendix X. The largest share of imports were from the U.K. and West Germany.

12.2. According to statements received by the Commission from the Director General of Commercial Intelligence and Statistics the total horse power of imported motors were 159,509 h.p. in 1960, 168,377 h.p. in 1961 and 114,312 h.p. in 1962.

12.3. Electric motors and parts thereof fall under serial Nos. 32(a), (b), (c), (d) and (e) of Part II of the Import Trade Control Policy. The import of fractional horse-power motors which was allowed on a restricted scale in the licensing periods prior to April, 1963 has been completely banned during the current licensing period April, 1963—March, 1964. The imports of squirrel cage three phase motors are totally banned except as parts of machinery and equipment under certain conditions. Actual users' applications are considered *ad hoc* for import of flame-proof motors conforming to BSS: 741 of 1937 and no licences are issued for other types of motors.

12.4. We have been informed by D.T.D. that there being not enough capacity in the country for the manufacture of higher h.p. motors a large part of this demand is met from imports. High voltage motors have not so far been manufactured and the entire requirement is currently met by imports. These are, however, due to be produced by Heavy Electricals (India) Ltd. in future according to its production programme.

12.5. It has been represented to us by Refrigerator (India) Pvt. Ltd., Calcutta that the import of D.C. motors may be allowed on a restricted scale as there are still D.C. areas in some parts of India where D.C. motors are required not only for replacement but also for new installations for both household and industrial purposes. As universal motors are currently being produced by some of the indigenous manufacturers we bring the above representation to the notice of D.T.D. for necessary action, with reference to the manufacturing facilities available with the indigenous producers.

Exports

13.1. As at the time of the last inquiry, we found that the export of electric motors has continued to be very limited. According to our foreign trade statistics the total number exported in 1962 was 69 valued at Rs. 82,646. The countries to which the exports were made included some Middle East Countries, Italy and West Germany. The principal exporters were Jyoti Ltd., Kirloskar, G.E.C. and Crompton Parkinson. The motors of Jyoti Ltd. were exported as components of its pumps indicating that export prospects are likely to be better if motors can go out as part of other marketable equipment. All the producers have expressed serious doubts about the prospects of developing the export market to any appreciable extent in view of their handicaps in respect of the high cost of raw materials *vis-a-vis* their competitors abroad some of whom are reported to sell in the export markets below domestic prices. Exports can be built up only at some sacrifice and would call for establishment of sales agencies and propaganda abroad. The Indian Electrical Manufacturers' Association has generally endorsed this view and stressed that an effective export drive of abiding significance is possible if only a scheme could be drawn under which supply of raw materials is made to exporters at cost. We have already examined this problem at length in paragraph 9 in which we have indicated how the difficulties in respect of high raw material cost could be overcome only by a change in the production technique on the lines of overseas manufacturers and change over to class 'E' insulation and aluminium die-cast rotors wherever possible. We are satisfied that by the adoption of modern techniques which the producers are called upon to follow as much in their own interest as in the discharge of the obligations of a protected industry to its customers, by timely recourse to measures bringing about reduction in costs and prices, the export prospects can be materially improved by the industry itself backed by suitable export incentives. The incentives available at present appear to be fairly comprehensive and we have not received any specific suggestions for their enlargement.

Estimate of costs of production and fair ex-works prices.

14.1. As stated in paragraph 3.2 two units, namely, Kirloskar Electric Co. Ltd., Bangalore and Bharat Bijlee Ltd., Bombay were selected by us for costing for purposes of determining the costs of production of indigenous electric motors. The production of electric motors by these units has been costed by our Cost Accounts Officers for their latest accounting year ending 30th June, 1962. The items for which detailed costing has been done cover the major part of the output of the units, both in number and horse power and are fairly representative of their pattern of production during the costed period. The reports of our Cost Accounts Officers are forwarded separately as confidential enclosures to this Report.

14.2. On the basis of the actual costs of production during the period investigated as compiled by our Cost Accounts Officers, we have estimated the future costs of production for the two units for different kinds of electric motors after discussing relevant points with the representatives of the costed units. Our estimates of future costs and future fair ex-works prices are given in the following statements.

14.3. In preparing the estimates of fair ex-works costs and prices we have taken into consideration the increased volume of production envisaged by the units during the next three years. The pattern of production which prevailed during the costed period has been generally assumed to continue as no definite indication of any significant changes therein in the near future could be given by the units. As regards raw materials the latest available rates have been taken into account including additional levies under the Finance Act, 1963. Consumption of the raw materials has been taken on the basis of standard specifications as adopted for the costed period after necessary adjustments in waste percentages which in certain cases were admittedly high in the costed period. In respect of conversion charges the cost elements which called for proper apportionment between manufacture of electric motors and other manufacturing activities of the units have been duly allocated taking into consideration the estimated production of electric motors as well as other activities. Provision has been made for future increase in labour charges both to cover the annual increments and the larger output where necessary. Depreciation has been calculated at the income-tax rates after inclusion of additions to assets considered necessary to maintain the estimated level of output and account has been taken of emergency risk insurance. We have allowed a return of 12 per cent on capital employed as for other industries during our recent investigations. The working capital element in the capital employed has been computed at an amount equivalent to 4 months' cost of production excluding depreciation.

Estimates of fair ex-works prices of motors manufactured by Unit 'A'

(In Rupees per Motor)

Type	Totally enclosed Fan Cooled (Squirrel Cage)						Loom	Hollow Spindle		Slip Ring		
H.P.	1	2	3	3	5	60	1	5	30	50	100	300
No. of Poles	4	4	2	4	4	4	6	4	4	4	4	4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1. Raw Materials	139·08	172·02	173·12	225·39	265·89	2,974·62	212·14	390·80	2,383·57	1,925·89	3,510·64	7,891·27
2. Conversion Charges.	39·71	47·12	47·00	43·38	53·77	395·90	56·27	138·98	315·68	279·28	847·04	2,751·16
3. Painting and Packing.	13·95	13·95	13·95	16·52	16·52	107·63	15·33	21·49	73·75	98·96	117·63	139·49
4. Royalty .	..	..	..	..	..	..	..	..	..	..	..	..
5. Depreciation	5·21	6·18	6·17	5·69	7·06	64·34	7·38	22·59	51·31	45·39	137·67	379·50
6. Return .	16·67	20·17	20·25	24·53	28·94	298·63	24·54	48·38	238·09	198·06	388·87	940·91
7. Fair Ex-works Price.	214·62	259·44	260·49	315·51	372·18	3,841·12	315·66	622·24	3,062·40	2,547·58	5,001·85	12,102·33
Say Rs.	215	259	260	316	372	3,841	316	622	3,062	2,548	5,002	12,102

Type	Totally enclosed Fan cooled (Slip Ring)	Screen Protected Drip Proof (Squirrel Cage)									
H.P.	50	7·5	10	15	20	20	30	50	150	200	250
No. of Poles	6	4	4	4	4	6	4	4	4	4	4
(1)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1. Raw Materials ·	3,688·58	361·11	408·35	560·11	627·65	1,015·18	1,003·66	1,586·54	3,055.64	4,601.94	5,971·92
2. Conversion Charges.	491·62	57·61	71·86	85·07	149·60	133·18	135·06	198·59	387.07	526.61	950·88
3. Painting and Packing.	117·63	22·04	22·04	31·91	31·91	66·91	66·91	98·96	117.63	127.54	139·49
4. Royalty · ·	..	..	..	..	..	..	..	..	191.50	234.00	271·50
5. Depreciation ·	79·90	7·56	9·43	11·16	19·63	21·64	21·95	32·27	62·91	85.53	154·54
6. Return · ·	369·04	37·79	43·13	58·02	69·87	104·27	103·48	161·55	321.58	470.02	631·27
7. Fair Ex-works Price	4,746·77	486·11	554.81	746.27	898·66	1,341·18	1,331·06	2,077·91	4,136.33	6,045.64	8,119·60
Say (Rs.)	4,747	486	555	746	899	1,341	1,331	2,078	4,136	6,046	8,120

Estimates of fair ex-works prices of motors manufactured by Unit 'B'

(In Rs. per Motor)

Type	Coolant Pump	Totally Enclosed			Totally Enclosed				Screen Protected
H.P.	0·15	2·00	3·00	3·60/4·50	10·00	15 00	40·00	60.00	5·00
No. of Poles	. .	6	4	4	4	4	6	4	4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Raw Materials . . .	38·38	235·73	133·09	234·10	404·14	650·21	1,965·82	2,173·18	255·76
2. Conversion Charges . .	46·41	181·07	112·47	140·99	217·33	314.11	468.67	468·24	151 67
3. Painting and Packing . .	1·75	12 22	8·29	12·53	20·30	22.26	65.44	65·44	12·53
4. Service Charges . . .	1·94	9·40	5·56	8·36	13 81	21·34	52.34	56·64	9·11
5. Depreciation . . .	5·98	22·85	14·23	17·40	26·62	38.01	50.28	50·28	18·74
6. Return	8·13	34·99	21·27	29·09	46·41	69·07	139·38	147·66	31·42
7. Fair Ex-Works Price . .	102·59	496·26	294·91	442·47	728·61	1,115·00	2,741·93	2,961·44	479·23
Say (Rs) .	103	496	295	442	729	1,115	2,742	2,961	479

C. i. f. prices and landed costs comparison with fair ex-works prices of indigenous electric motors.

15.1. In connection with the present inquiry we were furnished by the Collectors of Customs of Bombay, Madras, and Calcutta and Cochin with c.i.f. prices of certain imported electric motors, which, as already stated, continue to be severely restricted, some of the categories being banned. As at the last inquiry the prices furnished by the Collectors of Customs were not comparable being either special types of motors not manufactured in this country or otherwise being of specifications different from those for which we have estimated fair ex-works price. We have, however, obtained some comparable c.i.f./f.o.b. quotations of motors from certain importing firms and from manufacturers with foreign collaboration and these are set out in Appendix XI. It will be noticed from this Appendix that c.i.f. quotations have been furnished by several importing firms for electric motors of comparable types manufactured in U.K. which was and still is one of the principal source of our imports. Such figures for fractional h.p. motors were not available. Further, most of these quotations are for class 'A' insulation which is extensively in vogue among producers of electric motors in this country. We have, taken representative quotations for the purpose of comparison with our estimated fair ex-works prices adding 1 per cent thereto in respect of clearing charges for the determination of their corresponding landed costs. For the 'E' class type also, which is currently being produced by one of the costed units, we have received a few f.o.b. quotations for British manufacture and in respect of one of the costed items of this class of comparable horse power we have taken the lowest of these f.o.b. quotations into account and have added, as advised by the importers, 10 per cent thereto for the determination of the approximate c.i.f. prices in Indian ports, the landed costs in this case also being determined by an addition of further 1 per cent on account of clearing charges. In determining the advantage or disadvantage of indigenous manufacture of electric motors *vis-a-vis* foreign competition for the purpose of protection it was agreed at the public inquiry that a comparison with imports from U.K. would provide a reasonable basis.

15.2. In the following statements a comparison is made of the fair ex-works prices of indigenous electric motors of certain types and ratings with estimated landed costs without duty of similar types and ratings of imported motors.

Requirement of protection.

16.1. The statements set forth under the foregoing paragraphs show the comparative position of our estimated fair ex-works prices of indigenous motors *vis-a-vis* the landed costs without duty of corresponding imported motors. In the case of motors of totally enclosed fan cooled squirrel cage type the indigenous industry generally suffers from a disadvantage but the relative position is found varying for the high and low horse power motors and also in respect of slip-ring motors belonging to this category. In respect of 60 h.p. motors one of the units has a nominal advantage of 7.77 per cent and the other has an advantage of 29.12 per cent. For the lower ratings there is a dis-

Statement showing comparison of estimated fair Ex-Works prices (With "A" Class Insulation) of Indigenous Motors with Landed cost (Without duty) of Imported Motors

Manufactured by Unit 'A'

	Totally enclosed, Fan cooled, Squirrel cage						Slipring, Screen protected.		
Horse Power	1	2	3	3	5	60	50	100	300
Poles	4	4	2	4	4	4	4	4	4
1	2	3	4	5	6	7	8	9	10
1. C. I. F. Prices . .	187·00	239·00	288·00	255·00	342·00	4,120·00	2,540·00	4,930·00	11,200·00
2. Customs Duty (15%) .	28·05	35·85	43·20	38·25	51·30	618·00	381·00	739·50	1,680·00
3. Clearing Charges (1%)	1·87	2·39	2·88	2·55	3·42	41·20	25·40	40·30	112.00
4. Landed Cost with duty (1+2+3).	216·92	277·24	334·08	295·80	396·72	4,779.20	2,946·40	5,718·80	12,992·00
5. Landed cost without Duty (1+3).	188·87	241·39	290·88	257·55	345·42	4,161·20	2,565·40	4,979·30	11,312·00
6. Estimated Fair Ex-works Price.	214·62	259·44	260·49	315·51	372·18	3,841·12	2,547·58	5,001·85	12,102·33
7. Difference between (6) and (5).	25·75	18·05	—30·39	57·96	26·16	—320·08	(—)17·82	22·55	790·33
8. Difference (7) as %age of c. i. f. price (1).	13·72	7·55	—10·55	22·73	7·82	—7·77	0·70	0·46	7·06

Statement Showing comparison of estimated fair Ex-Works Prices (With "A" Class Insulation) of Indigenous Motors with Landed cost (Without duty) of Imported Motors—Contd.

Manufactured by unit 'A'

	Slip-ring, T.E., F.C.	Screen Protected, Squirrel cage.					
Horse Power	50	7·5	10	15	20	30	50
Poles	6	4	4	4	4	4	4
1	11	12	13	14	15	16	17
1. C. I. F. Prices	6,020·00	382·00	468·00	612·00	860·00	1,078·00	1,642·00
2. Customs Duty (15%) . . .	903·00	57·30	70·20	91·80	129·00	161·70	246·30
3. Clearing Charges (1%) . . .	60·20	3·82	4·68	6·12	8·60	10·78	16·42
4. Landed Cost with duty (1+2+3) .	6,983·20	443·12	542·88	709·92	997·60	1,250·48	1,904·72
5. Landed Cost without Duty (1+3) .	6,080·20	385·82	472·68	618·12	868·60	1,088·78	1,658·42
6. Estimated Fair Ex-works Price .	4,746·77	486·11	554·81	746·27	898·66	1,331·06	2,077·91
7. Difference between (6) and (5) . .	—1,333·43	100·29	82·13	128·15	30·06	242·28	419·49
8. Difference (7) as % age of c.i.f. price(1)	—222·11	26·25	17·55	20·94	3·50	22·48	25·55

Manufactured by Unit 'B'

	Totally enclosed				Screen protected
Horse Power	3	10	15	60	5
Poles	4	4	4	4	4
	'E' Class		'A' Class		
1	2	3	4	5	6
1. C. I. F. Prices	294·06	580·00	756·00	4,120·00	333·00
2. Customs Duty (15%)	44·11	87·00	113·40	61080	49·95
3. Clearing Charges (1%)	2·94	5·80	7·56	41·20	3·33
4. Landed Cost with Duty (1+2+3)	341·11	672·80	876·96	4,779·20	386·28
5. Landed Cost without Duty (1+3)	297·00	585·80	763·56	4,161·20	336·33
6. Estimated Fair Ex-works Price	294·91	728·61	1,115·00	2,961·44	479·23
7. Difference between (6) and (5)	—2·09	142·81	351·44	—1,199·76	142·90
8. Difference (7) as % age of c. i. f. price (1)	—0·71	24·62	46·49	—29·12	42·91

advantage for both units ranging from 7.55 per cent to 46.49 per cent, all for motors with 'A' class insulation. In one case (3 h.p. 2 poles) there is even an advantage of 10.55 per cent. In respect of motors with 'E' class insulation which one of the units has started manufacturing in lower ratings and are still considered to be in the developmental stage the disadvantage stands reduced completely. For slip-ring (Totally Enclosed Fan Cooled) motors of 50 h.p.,—required mostly for industrial use,—the indigenous industry has an advantage of 22.11 per cent. From these trends it will be seen that the disadvantage to the industry will progressively diminish from switch over to 'E' class insulation of motors. The diversification of output involved in producing higher h.p. motors also ensures further advantages. In respect of squirrel cage motors of screen protected type, for which the costed items were all of 'A' class insulation, the disadvantage of the indigenous industry ranges from 3.50 per cent to 42.91 per cent. Further, in the case of slip-ring screen protected type of motors also the indigenous industry has a disadvantage which ranges from 0.46 per cent to 7.06 per cent. The variations in the percentages of estimated difference for the two units for motors belonging to the same category and h.p. are attributable to their respective costs and also to the disparity in some cases in the corresponding c.i.f. prices which represent quotations for the products of different manufacturers in U.K. We consider that the over-all position has not altered materially since the last inquiry.

16.2. In our last Report (1961), despite our finding that in respect of several types of motors the indigenous producers had attained a position of advantage or had a nominal disadvantage, we had recommended continuance of protection *inter alia* on the consideration that the industry was embarking on large scale expansion and diversification and was attempting to take up the manufacture of motors of progressively higher ratings and special types not manufactured in the past. While there has been a welcome progress in the manufacture of higher ratings by the producers according to their conventional designs, the expectations in respect of diversification, except for flame-proof motors, and improvement of the technique, particularly about the adoption of class 'L' insulation and use of aluminium die-cast rotors have not, been fulfilled, although it was impressed upon the producers that these had great potentialities in reducing cost and had thus an important bearing on tariff protection. By and large the producers have still reported themselves to be in different stages of planning. From the evidence placed before us we are convinced that the unsatisfactory progress of the manufacturers in this respect is attributable to no small extent to a lack of determined and energetic drive on their part in this direction in a sheltered market. At the same time the need for improving the raw material position for the industry to make greater progress cannot be gainsaid. However, in so far as the disadvantages do persist and the measures for improvement of technique and diversification of production have been taken in hand by many of the producers the industry deserves to be given an opportunity for their effective implementation. For the realisation of the economic potential of the industry, there would appear to be a *prima facie* valid case for continuance of protection for a further period. The desirability of strengthening the small scale sector which has a due role to play has to be accepted. Another major consideration is that the manufacture of motors of still higher ratings not only by private sector units in production but also by Heavy Electricals (India) Ltd., Bhopal which has already embarked on its large manufacturing programme requires due assistance and protection against possible foreign competition. It will take time for the diverse output of these units to stabilise. The need for continued protection is also called for in so far as the indigenous sources of some of the important raw materials have to be developed further to meet the requirements of the industry. All this indicates the need for continuing the protection for developmental purposes. The continuance of protection has been urged emphatically by the Indian Electrical Manufacturers' Association, and the Directors of Industries of most of the States in which a large number of small scale units are situated have expressed themselves in its favour. The demand of the producers in this respect has been supported also by important consumers. In the light of these and other relevant considerations we recommend that protection to the electric motor industry should be continued for a further period of two years ending 31st December, 1965 and that the scheme of protection should cover (i) squirrel cage and slip-ring induction motors and synchronous motors of a brake horse power up to 3,000 h.p., but excluding variable speed commutator motors, (ii) single phase motors of 1 h.p. to 3 h.p., (iii) fractional horse power motors and (iv) component parts of all these types of motors excluding control gear. The limited period of two years is advisedly recommended by us, as a longer term is apt to delay the adoption of the necessary improvements in production technique particularly in regard to class 'E' insulation and aluminium die-cast rotors. We are aware that in conditions of restricted imports compelled by foreign exchange stringency, which is likely to continue for some time, the tariff protection by itself may not provide an effective incentive in this direction. We have, therefore, recommended in paragraph 9 that, apart from the question of protective tariff for the better development of the industry, Government should take necessary steps for ensuring the most economical and effective utilisation of imported raw materials like copper by the producers of electric motors.

16.3. We have not received any request from the producers for an enhancement of the prevailing duties. However, Bharat Bijlee Ltd., which has been producing both 'E' class and fractional horse power motors has stated that while a 35 per cent protective duty might be adequate,—having regard to the current difference in prices of indigenous and imported motors—the present rates of duty may be continued in view of the prevailing restrictive import control policy of Government which provides an effective safeguard against foreign competition. The issue of determining the necessary quantum of protection has been examined by us in the light of comparative statements set forth under paragraph 15. While on a scrutiny of the differences measured against the over-all production of the costed units an increase in the present rate of 15 per cent is indicated, this in our opinion cannot and should not constitute the only criterion for determining the quantum of protection in the present condition of the industry. Apart from the results of the costed period the industry has an assurance of better prospects of economy if only it takes necessary action for speedy and effective implementation of the improved techniques already referred to. As pointed out in paragraph 9 a changeover to class 'E' insulation and aluminium die-cast rotors should in itself bring about an economy in cost to the tune of about 30 per cent on the average. The changeover need not entail any serious time lag as there is no question of any fresh capital installation involved. With the prevailing import control policy any enhancement of the rate of duty will not really help the producers as no imports of types indigenously manufactured are likely to be allowed. It will only cast a burden on the users of the imported variety who have no recourse to an alternate indigenous product. We, therefore, recommend that the existing rates of protective duties should be continued for the extended period of two years recommended by us and the duty of 15 per cent should be made applicable to squirrel cage and slip-ring induction motors and synchronous motors of higher ratings over 500 h.p. up to 3,000 h.p.

Modifications to Indian Customs Tariff Schedule

17. If our recommendations in paragraphs 15 and 16 are accepted, then Item No. 72(14) of the First Schedule to the Indian Tariff Act, 1934 should be amended as indicated below.

Item No.	Name of article	Nature of duty	Standard rate of duty	Preferential rate of duty if the article is the produce or manufacture of			Duration of protective rates of duty
				The United Kingdom	A British Colony.	Burma	
1	2	3	4	5	6	7	8
72(14)	(a) the following electric motors namely :						
	(i) Squirrel cage and slip ring induction motors and synchronous motors of a brake-horse-power not exceeding 3,000 but not less than one brake-horse-power, excluding variable speed Commutator motors.	Protective	15% *ad valorem*	..	..	Free	December 31st, 1965.

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1	2	3	4	5	6	7	8
	(ii) Single phase motors of a brake-horse-power not exceeding 3 but not less than one brake-horse-power.	Protective	15% *ad valorem*	..	..	..	December 31st, 1965.
	(iii) Fractional h. p. motors of not less than one quarter of one brake-horse-power.	Protective	15% *ad valorem*	..	..	..	December 31st, 1965.
	(iv) Fractional h. p. motors of less than one quarter of one brake-horse-power.	Protective	35% *ad valorem*	..	..	..	December 31st, 1965.
	(b) Component parts of electric motors as defined in sub items (i), (ii), and (iii) of item 72(14) (a), but excluding control gear for the same, provided that only such articles shall be deemed to be component parts as are essential for the working of the electric motors and have been given for that purpose some special shape or quality which would not be essential for their use for any other purpose.	Protective	20% *ad valorem*	..	..	Free	December 31st, 1965.
	(c) Component parts of electric motors as defined in sub-item (iv) of item 72(14) (a).	Protective	35% *ad valorem*	..	..	..	December 31st, 1965.

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Selling system and selling prices.

18.1. The selling system and arrangements of the producers, as reported by them, have not undergone any significant change since the last inquiry. While most of the producers have sole selling agents or sole distributors actual sales are generally handled by dealers appointed by the latter for different parts of the country. In some cases the agents take responsibility for after sales service. Some of the producers also make direct sales to consumers. Many of them, particularly those in the large scale sector, have published list prices at which the motors are sold. The sole selling agents or distributors are allowed a commission on list prices ranging from 18½ to 27 per cent. The producers or their agents allow varying discounts on the list prices also to the consumers and some of them have stressed that the industry has now entered a phase of keen competition. There has been an improvement in the delivery position since the last inquiry. While motors of 1 to 10 h.p. have continued to be available from stock, similar facilities for ex-stock delivery are now reported to be available for motors of 10 to 30 h.p. For motors of higher ratings up to 50 h.p. also there has been a noticeable shortening of the delivery period. For still higher ratings we have received several complaints from the D.G. S. & D. and also from some important industrial consumers about protracted delivery. We have brought these to the notice of the representatives of producers at the public inquiry for necessary and possible remedial action. The producers have stated in this connection that the delivery periods now quoted for such motors are not unduly long and that for motors which are required as part of capital equipment it should be possible for the indentors to finalise their purchase requirements well in advance in the planning stage and place orders accordingly which in effect would help to avoid complaints of protracted delivery. The matter, in our opinion, calls for a careful consideration on both sides on the basis of mutual understanding and co-operation to improve and maintain delivery conditions at a satisfactory level. We may point out that the prospects in this regard may deteriorate in future in view of the rapidly rising demand for motors envisaged from 1964 onwards unless timely steps, as recommended by us in paragraph 7.4., are taken for installation of additional capacity and increase in domestic production.

18.2. As regards prices we have not received any specific complaints in connection with the present enquiry. From the facts and evidence placed before us, however, it appears that prices of indigenous motors particularly for the higher ratings of certain types are disproportionately high. We should like to point out in this connection that the absence of complaints about prices does not, in conditions of restricted imports and overall shortage, mean that the manufacturers have been discharging satisfactorily the responsibilities of a protected industry which require them to make determined and energetic efforts to reduce costs and prices and pass on a corresponding benefit to the consumer who has borne the burden of protection all along. In paragraph 9 we have discussed the position in this respect at length and have drawn attention to the fact that the indigenous producers have not hitherto moved energetically enough in the matter of adopting improved techniques in specified directions holding assured prospects of a substantial economy in costs. In effect the consumer has been denied the benefit of a consequential reduction in prices and the export prospects have remained severely limited. Evidently, the industry which has been enjoying protection for over fourteen years owes a special obligation to the consumer to requite his burden fully and at the earliest as also for strengthening the economy of the country by improving the export prospects which are conditioned by an effective reduction of the prices to a competitive level. The further two years protection which we recommend will put the efficiency and endeavour of the industry to an acid test.

Summary of conclusions and recommendations.

19.1. Our conclusions and recommendations are summarised as under:—

19.1.1. The Department of Technical Development should bring its list of producers up to date by including all the licensed units which are already in production and also by giving the reassessed capacity of the units based on their recent performance.

[Paragraph 6.1]

19.1.2. The total installed capacity of the large scale sector of the industry currently stands at 1,211,040 h.p. and is due to increase to 2,644,660 h.p. with the installation of additional capacity licensed. The capacity of the small scale sector has been assumed as 0.1 million h.p. on consideration of the production actually achieved by it and the Development Commissioner is requested to verify the figures of capacity given by him.

[Paragraphs 6.1. and 6.2]

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19.1.3. The total production of electric motors in the large scale sector during the years 1960, 1961 and 1962 was 740,648 h.p., 854,641 h.p. and 972,138 h.p. respectively, while in the small scale sector it was 62,796 h.p. 66,318 h.p. and 87,780 h.p. respectively.

[Paragraph 6.3.1]

19.1.4. The demand for electric motors for the years 1963-64, 1964-65 and 1965-66 is estimated at 2 million h.p., 3.0 million h.p. and 5 million h.p. respectively.

[Paragraph 7.3]

19.1.5. In order to avoid any possible deficiency in production during the next few years, Government should see to expeditious installation of the capacity already licensed and assist in future expansion of double shift working in all suitable units by ensuring adequate supply and proper utilisation of raw materials. If on a reassessment of the position, these measures are found inadequate for stepping up the production to the required level of demand timely action should be taken for licensing of additional capacity.

[Paragraph 7.4]

19.1.6. In view of the large gap between indigenous production and demand for electric sheet steel envisaged in the coming years it is desirable that steps are taken by TISCO to expedite the installation of its additional capacity and Government should afford the necessary facilities to it in this direction. Hindustan Steel should also explore the possibility of manufacturing dynamo grade sheet steel before April, 1966 by any feasible adjustments in its production programme.

[Paragraph 8.4.1.2]

19.1.7. Government should give the requisite facilities, with higher priority either to the existing producers of stampings or to the manufacturers of motors whose own requirements are sizeable to increase the total installed capacity to a commensurate level as this would involve a saving for capital equipment required for fresh units and facilitate optimum utilisation of the existing capacity.

[Paragraph 8.4.1.6]

19.1.8. The Department of Technical Development should examine the question of availability of enamelled copper wires for motors of bigger and larger h.p. and direct the required modification in the pattern of production following up, if necessary, by larger allocation of copper.

[Paragraph 8.4.2.1]

19.1.9. Till such time that there is improvement in the overall supply position of pig iron a special priority may be accorded to the electric motor industry as its products constitute an important item of capital equipment and has assumed greater significance for speeding up the industrialisation of the country.

[Paragraph 8.4.5]

19.1.10. The complaints about irregular and short supply of steel rods and bars are brought to the notice of Government for an assessment of the industry's present and future demands and for laying down a programme to meet its requirement adequately either from indigenous sources or from imports.

[Paragraph 8.4.6]

19.1.11. The progress made by the industry in respect of the changeover to class 'E' insulation and adoption of aluminium die-cast rotors, which have great potentialities for reducing cost, has not been satisfactory.

[Paragraphs 9.2. and 9.3.1]

19.1.12. Having regard to the avoidable strain on foreign exchange and the wasteful use of scarce raw materials resulting from the present manufacturing practices of the producers, Government should take steps for regulating allocation of raw materials to the industry in a manner that will ensure their most economical and fullest possible utilisation with the adoption of class 'E' insulation for all approved uses and lay down a phased but definite programme for the industry for the changeover in the shortest possible time.

[Paragraph 9.3]

19.1.13. The non-acceptance of motors with higher temperature rise by the Insurance Association of India for use in ring frames etc. (although such motors are accepted in the textile industry in other countries) is perhaps a case of adherence to traditions rather than based on any special study and Government should ask insurers to adopt a more progressive and helpful attitude.

[Paragraph 9.3]

19.1.14. As in the case of cable industry Government should set an early date as target for the industry to changeover to aluminium die-cast rotors for motors (squirrel cage) progressively up to 30 h.p. Government should however, give necessary facilities to the industry to enable it to acquire the requisite equipment and dies for this purpose.

[Paragraph 9.3.1]

19.1.15. Government should undertake an examination of the possibility of establishing centralised services for the small scale sector in suitable areas as early as possible with a view to bringing the economic advantages of aluminium die-cast rotors within the reach of small scale units.

[Paragraph 9.3.2]

19.1.16. For effective implementation of the measures for improvement of technique and diversification of production as well as for developmental purposes in respect of higher ratings of motors now planned for manufacture in both public and private sector units and other considerations stated in paragraph 16.2., protection to the electric motor industry should be continued for a further period of two years ending 31st December, 1965, and the scheme of protection should cover (i) squirrel cage and slip-ring induction motors and synchronous motors of a brake-horse power up to 3,000 h.p. but excluding variable speed commutator motors, (ii) single phase motors of 1 h.p. to 3 h.p., (iii) fractional horse power motors and (iv) component parts of all these types of motors excluding control gear.

[Paragraph 16.2]

19.1.17. The existing rates of protective duties should be continued for the extended period of two years and the duty of 15 per cent should be made applicable to squirrel cage and slip-ring induction motors and synchronous motors of higher ratings over 500 h.p. up to 3,000 h.p.

[Paragraph 16.3]

19.1.18. If the recommendations to continue protection to the electric motor industry are accepted, item No. 72(14) of the First Schedule to the Indian Tariff Act, 1934 should be amended as indicated in paragraph 17.

[Paragraph 17]

19.1.19. The industry which has been enjoying protection for over fourteen years owes a special obligation to the consumer to requite his burden fully and at the earliest as also for strengthening the economy of the country by improving the export prospects which are conditioned by an effective reduction of the prices to a competitive level.

[Paragraph 18.2]

Acknowledgements

20. We thank the producers, importers, consumers and associations who have furnished useful information and whose representatives gave evidence before us, in connection with this inquiry.

K. R. P. AIYANGAR,
Chairman.

J. N. SEN GUPTA,
Member.

R. BALAKRISHNA,
Member.

PRAMOD SINGH,
Secretary.

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BOMBAY:
Dated the 31*st July,* 1963.

APPENDIX I

(*Vide* paragraph 3.1)

List of parties to whom Commission's questionnaire/letters were issued and from whom replies were received

*indicates that the party has replied.

@indicates the party's disinterestedness.

A. PRODUCERS ASSOCIATION :

*1. Indian Electrical Manufacturers' Association, India Exchange, Calcutta-1.

2. The Small-scale Electric Motor Manufacturers' Association, C/o. Batliboi & Co., Forbest Street, Bombay-1.

B. LARGE-SCALE SECTOR :

1. Argus Engineering Co. Ltd., Peelamedu Post, Coimbatore.

*2. Associated Electrical Industries Manufacturing Co. Pvt. Ltd., Crown House, 6, Mission Row, Calcutta-1.

*3. Bharat Bijlee Ltd., Udyog Nagar, Bombay-22.

*4. British India Electric Construction Co. Ltd., 6, Mayurbhanj Road, Calcutta-23.

*5. Crompton Parkinson (Works) Pvt. Ltd., Haines Road, Worli, Bombay-18.

6. Eastern Electrical Co. Ltd., Singanallur P.O. Coimbatore (District).

*7. Electric Construction & Equipment Co. Ltd., 9. Kaliprasanna Singhee Road, Calcutta-2.

*8. The General Electric Company of India (Manufacturing) Private Ltd., 58, Taratalla Road, Garden Reach, Calcutta-24.

*9. The Hindustan Eletcric Co. Ltd., Industrial Area, Faridabad (East Punjab).

*10. Jyoti Ltd., Baroda-3.

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*11. Kirloskar Electric Co. Ltd., Post Box No. 1017, Bangalore-3.

12. National Electrical Industries Ltd., Industrial Estate, Lalbaug, Bombay-12.

*13. P.S.G. Industrial Institute, Peelamedu Post, Coimbatore.

*14. Motor & Machinery Manufacturers Ltd., 31, Chittaranjan Avenue, Calcutta-12.

15. Orient General Industries Ltd., 8, Royal Exchange Place, Calcutta-1.

16. P. Govindaraj & Sons (Private) Ltd., 44, Thyagaraya Road, Madras-17.

17. Coimbatore Premier Corporation Pvt. Ltd., Post Box No. 210, 34, Avanashi Road, Coimbatore-1.

*18. Shri Ramakrishna Mission Vidyalaya Industrial Section, Sri Ramkrishna Vidyalaya P.O., Perianaickenpalayam.

19. Shri Jayachandar Engineering Works, 9/431, Mettupalayam, R. S. Puram, Coimbatore.

20. Ogale Glass Works Ltd., Ogalevadi District North Satara.

*21. Karthikeya Foundry, Post Box No. 307, Pappanaickenpalayam, Puliakulam Road, Coimbatore-1.

*22. Texme Industries, Mettupalyamm Road, R. S. Puram Post, Coimbatore-2.

23. Vijaya Foundry, Pappanaickenpalayam, Coimbatore.

24. Best & Company Private Ltd., 13/15, North Beach Road, Post Box No. 63, Madras-1.

25. Broadway Engineering & Transport Co., 5/5, Old Post Office Road, Coimbatore.

26. Engineering Products Private Ltd., Ghodbunder Road, Jogeshwari, Bombay-60.

27. Beegee Corporation (Private) Ltd., The Mall, Patiala.

C. GOVERNMENT UNDERTAKINGS :

*1. Heavy Electricals (India) Ltd., Post Box No. 46, Govind Pura, Bhopal.

*2. Nahan Foundry Limited, Nahan, (Himachal Pradesh).

*3. New Government Electric Factory, Post Bag No. 84, Bangalore-1.

4. Government of India Production Centre (Electric Motors), Tiruvalla, Kerala.

D. SMALL-SCALE SECTOR :

Punjab :

1. M/s. Minha Industries, Nehru Garden Road, Jullundur.
2. M/s. Golden View Industries, Chowk Sodal, Jullundur.
3. M/s. Chandha Engg. Works, G. T. Road, Jullundur.
*4. M/s. Capital Industries, Kapurtala Road, Jullundur.
5. M/s. Punjab Elec. Corporation, C.I.S. Kapurthala Road, Jullundur.
6. M/s. Supreme Electric Engg. Co., Central Mills, Jullundur.
7. M/s. Excelsior Electric Co., Central Mills, Jullundur.
8. M/s. Guru Nanak Iron & Steel Co., Railway Road, Jullundur.
*9. M/s. Khalsa Foundry C.I.S. Ltd., Sultanpur Lodhi, Punjab.
10. M/s. Polex Elec. Corporation, Ali Bux Road, Behind Hide Market, Amritsar.
11. M/s. K. M. Corporation, Opp. Gole Bagh, Amritsar.
12. M/s. Vickson Industries, Sultanwind Road, Amritsar.
13. M/s. General Electric Mfg. Co., Queen Road, Amritsar.
14. M/s. Atlas Elec. Works, Opp. Mal Mandi, Amritsar.
15. M/s. Beegee Motors (P) Ltd., Patiala.
16. M/s. Moonlight Industries, Sirhind Gate, Patiala.
17. M/s. C. Lal Elec. and Mech., Near Sessions Court, Ambala.
18. M/s. Bharat Machinery Works, 461-62, Ind. Area 'B', Ludhiana.

Gujarat :

19. M/s. Manu Engineering Works, Ramkumar Mill Compound, Ahmedabad.
20. M/s. National Engineering Works, Ramkumar Mill Compound, Ahmedabad.
21. Waghel & Sons, Zampa Bazar, Surat.
22. Paradise Industries Pvt. Ltd., 33-A, Industrial Estate, Rajkot.
23. Sunbeam Metal Industries, C/1881, Salabatpura, Surat.
24. Bomin Pvt. Ltd., Odhav Road, Ahmedabad.

Rajasthan :

25. Bharat Industries, Chaupasni Road, Jodhpur.

Uttar Pradesh:

26. U. P. National Manufacturers (P) Ltd., C 21/15, Sohu Gopal Lane, Varanasi.
27. Santosh Industries, 87/6, Hiraganj, Kanpur.
28. Metal India Works, 145-Lahartara,· Varanasi.
*29. Vansal & Vansal, 145/696, Kalpi Road, Kanpur.
30. Som Engg. Corpn., 14/78, The Mall, Kanpur.
*31. Chandra Electrical, Beyond Varuna Bridge, Varanasi.
32. Anand Electric Works, 110/173, R. K. Nagar, Kanpur.

Kerala :

*33. Jupiter Engineers, Metind Nagar, Soranur (Palghat Dist.), Kerala State.
34. Thacker Engg. Corpn., Mundayad, Cannanore, Kerala State.

Delhi :

35. Kartar Singh & Co., Krishna Building, Pahar Ganj, Chuna Mandi, New Delhi.
36. Ajaya Electricals, 18, D. L. F. Area, Najafgarh Road, New Delhi.
37. Gautam Electric Motors (P) Ltd., 43, Industrial Estate, Okhala, Delhi.
*38. Prem Brothers, 73-G. B. Road, Delhi.
39. Guru Nanak Electrical & Mechanical Works, 4/2, New Rohtak Road, New Delhi.
*40. Himalaya Engg. Works, 2646, Multani Dhanda, Pahar Ganj, New Delhi.
41. J. P. Kamal Engg. Works, 981, Hamilton Road, Delhi.
*42. Superior Electric Co., 17, Netaji Subhash Road, Darya Ganj, Delhi.
*43. Oswal Engg. & Mechanical Works, 49, Industrial Area, Faridabad.

Andhra Pradesh :

44. Speedwell Electricals Pvt. Ltd., B-1, Industrial Estate, Sanat Nagar, Hyderabad.
*45. P. Govindraj & Sons Pvt. Ltd., Station Road, Guntur.
*46. Sree Venkateshwara Engg. Works, Berrery Road, Kurnool.

Mysore :

47. Mysore Electronic Mfg. Industries, Solapur, Belgaum.
*48. Manikbag Industries, Dharwar Road, Belgaum.
49. Electrocrafts, Tilakwadi, Belgaum.
50. Vale Electric Works, 3, Fort, Bus Stand Road, Bangalore-2.

Madras :

51. M. S. S. & V. K. C. Industries, 4, Bogi Street, Kogitha-Pattarai, Arcot Road, Vellore.
*52. Sri Laskhmi Foundry, Patel Road, Coimbatore-9.
53. Sugana Industries, 148, Patel Road, Coimbatore-9.
54. Sri Devi Industries, 97, Bodipatty, Udamalpet.
55. Nandgopan Industries Pvt. Ltd., Ramapatnam P. O. Pollachi Taluk, Coimbatore Distt.
56. Encel Industries Post Bag No. 1, Velandi-palayam, Coimbatore-11.

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57. Balasubramania Foundry, Patel. Road, Coimbatore.
58. Southern Engineering Industrials, P. B. No. 219, 343, Avanasni Road, Coimbatore.
59. The General Engg. Co., Patel Road, Coimbatore-9.
60. Govardhana Engg. Industries, Ukkedam, South Coimbatore-1.
*61. Sri Sakthi Engg. Works, Peelamedu, Coimbatore-4.
62. Lakshmi Narayana Industries, 287, Sathy Road, Gandhipuram, Coimbatore-12.
63. Jothi Engineering Works, B 3 & 4, Industrial Colony, Madurai-7.
*64. Subiah Foundry, Avanashi Road, P. N. Palayam, Coimbatore-1.
65. Leather Industries, 2, Pykara Office Road, Coimbatore-12.
*66. Navamani & Co., 2/246-248, P. N. Palayam, Coimbatore-1.
67. Shanmuga Foundry, Trichy Road, Singanallur P. O., Coimbatore-5.
68. Shree Krishna Foundry, Pappanaicken Palaiyam, Avanashi Road, Coimbatore-1.
69. Kamal Industries, Kuniamuthur, Palghat Road, Coimbatore-8.
70. The Kasturi Engineers Ltd., 8/4, Avanashi Road, Coimbatore.
71. Wakefield Engineering Co., Avanashi Road, Peelamedu, Coimbatore.
72. Eastern Electrical Co. (P) Ltd., 26/22, Aerodrome Road, Singanallur, Coimbatore.
73. Prakash Engineering Co., Saibaba Mission P. O., Mettupalayam Road, Coimbatore-11.
74. Pioneer Engineering Co., B-1, Industrial Colony, Madurai-7.
*75. Mouli & Sons, Cross Cut Road, Ramnagar P.O., Coimbatore-9.
76. T.R. Industrials, Kuniamuthur P.O., Coimbatore-8.
77. Peelamedu Industrial Corpn. Ltd., 234, Avanashi Road, Peelamedu, Coimbatore-4.

Maharashtra :

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*78. M/s. Alpha Electrical & Engg. Co., 30, Calicut Street, Fort, Bombay.
*79. M/s. Commercial Broadcast Pvt. Ltd., 27, Bastion Road, Bombay-1.
80. M/s. Sardar Radio House, Laxmi Bhavan, 466, Vallabhai Patel Road, Bombay-4.
81. M/s. Oriental General Electricals, 118, Bara Imama Road, Chorbazar, Bombay.
82. M/s. Shafi Ele. Industries, 227, Rippon Road, Bombay-8.
*83. M/s. Hind Electricals, Opp. Mazagaon Post Office, Bombay-10.
84. M/s. Rohit Bijli Products India, Laxmi Wollen Estate, Bombay.
*85. M/s. Shariff Ele. Works, C.S. No. 5/172, King Edward Rd., Sewri, Bombay-15.
*86. M/s. Narhari Engg. Works, India Timber Trading Co's Compound Sewri Cross Road, Bombay-15.
87. M/s. Industrial Ele. Equipment Co., Minerva Movitone Compound, Bunder Road, Sewri, Bombay-15.
**88. M/s. Electromech, 75, Annie Besant Road, Worli, Bombay-18.
89. M/s. Sortan Electricals, Bombay Dyeing Mill Compound, Shed, Old Prabhadevi Road, Bombay-28.
*90. M/s. Bhangar Bros. & Co. Pvt. Ltd., 142/48, G. B. Road, Jogeswari, Bombay-60.
91. M/s. Vidyut Industries Churiwadi, Arey Road, Goregaon.

92. M/s. Popular Ele. Works, 723, Taboot Street, Poona.
*93. M/s. Western India Engg. Co., Qasturichand Mills Estate, Dadar Road, Bombay-28.
*94. M/s. ACM Engg. Works, Sonawala Estate, Goregaon, Bombay.
95. Pioneer Electrical Industries, 58-B, Rippon Road, Jacob Circle, Bombay-11.
96. Harve Electricals, 4163, Goregaon (East), Bombay.
*97. Standard Engg. Works, Agra Road, Bhandup, Bombay-78.
*98. N. G. K. Electrical Industries, Gupta Mills Estate, Darukhana, Reay Road, Bombay-10.
*99. Globe Electricals Stores, 68-A, Mahatma Gandhi Road, Poona-1.
*100. Rai Electrical Industries, 88-A, Hadapsar Industrial Estate, Poona.

West Bengal :

*101. Weights & Measures Syndicate, 76/2, Ichapore Road, Howrah.
102. General Engineering & Electric Works, 9-Dinoo Lane, Kadamtala, Howrah.
*103. Machineries and Industries (India) Ltd., Strand Road, P.O. Burashibtala, Chinsurah, Hooghly.
*104. Allied Electrical Corpn. (P) Ltd., 10/1, Elgin Road, Calcutta-20.
105. Kshama Electric Works, 146, Shyamnagar Road, Calcutta-20.
106. Everest Appliances Pvt. Ltd., 32-Southern Avenue, Calcutta-29.
107. National Electrical Appliances Co., 10-Mall Road, Calcutta-28.
*108. Hindustan Electric & Engg. Co., 64/1, Beadon Street, Calcutta-6.

E. PROSPECTIVE PRODUCERS :

1. Calcutta Fan Works (P) Ltd., 19, Chowringhee Road, Calcutta-13.
2. Kasturi Engineers Ltd., 8/4, Avanashi Road, Coimbatore.
3. Laxmi Foundries, Patel Road, Coimbatore.
4. Balasubramania Foundry, Patel Road, Coimbatore.
5. Vasant Engineering Ltd., Pratapnagar, Baroda.
6. Rama Krishna Metals Alloy Industries, Sardar Patel Road, Benganathapuram, Coimbatore.
7. Engineering Works of India Private Ltd., 20, Ultadanga Road, Calcutta-4.
8. Indian Electric Tools Corporation 33/60, Rohtak Road, New Delhi.
9. Oriental Engineering Works (P) Ltd., P.O. Yamuna Nagar, Jagadhari R.S., Ambala Distt.
10. Dandeyuthapani Foundry, P. B. No. 278, P. N. Palayam, Coimbatore.
11. Sri Krishna Foundry, P.N. Palayam, Coimbatore.
12. Southern Engineering Industrials, 343, Avanashi Road, P. N. Palayam, Coimbatore-1.
13. Govardhana Engineering Industries, Ukkadam, Coimbatore-1.
14. Naw Mani & Co., Pappanaicken Palayam, Coimbatore.
*15. Tropical Engineering Co., 21, Forbes street, Bombay-1.
*16. General Engineering Co., Sardar Patel Road, Coimbatore-9.
17. Southern Industrial Corporation, P.O. Box No. 113, 6, Armenian Street, Madras-1.
*18. New India Electric Corporation, Pai Building, Hughes Road, Bombay-7.
19. Jauran Engineering Works (P) Ltd., Putli Garh Azad Nagar, Amritsar.
*20. J. Stone & Co. (India) Pvt. Ltd., 16, Taratalla Road, Post Box No. 16721, Calcutta-27.

*21. Lawkim Pvt. Ltd., 16, Horniman Circle, Bombay-1.

*22. Marsden Electric Ltd., C/o. Marsden Mills, Rakhilal Road, Ahmedabad-10.

*23. Matchwell Electricals (India) Ltd., Off Nagar Road, P.O. Yervada, Poona-6.

*24. Gandhi Electric Industries (P) Ltd., 94, Meadows Street, Bombay-1.

F. RAW MATERIAL SUPPLIERS :

*1. The Tata Iron & Steel Co. Ltd., Bombay House, 24, Bruce Street, Fort, Bombay-1.

*2. Devidayal Stainless Steel Industries Private Ltd., (Electrical Stampings Division), Darukhana, Reay Road, Bombay-10.

*3. Sankey Electrical Stampings Pvt. Ltd., Wakefield House, Sprott Road, Ballard Estate, Bombay-1.

*4. Hindustan Steel Ltd., Bihar Secretariat Building, P.O. Hinoo, Ranchi.

*5. The Indian Cable Co. Ltd., 9, Hare Street, Calcutta-1.

6. Devidayal Cable Industries Private Ltd., Darukhana, Reay Road, Bombay-10.

7. Electrial Industries Corporation, 33, Brabourne Road, Calcutta-1.

*8. National Insulate Cable Co. of India, 4, Dalhousie Square East, Calcutta-1.

*9. Shakti Insulated Wires Private Ltd., Bansilal Motilal Mansion, 22, Apollo Street, Bombay-1.

*10. Hindustan Transmission Products Ltd., Chandivali, Kurla Vihar Road, Bombay-70.

*11. Hindustan Wire Products Private Ltd., Patiala, East Punjab.

*12. Dr. Beck & Co. (India) Ltd., Gateway Building, Apollo Bunder, Bombay-1.

G. IMPORTERS :

*1. Associated Electrical Industries (India) Private Ltd., Crown House, 6, Mission Row, Calcutta-1.

*2. Balmer Lawrie & Co. (India) Ltd., 21, Netaji Subhas Road, Calcutta-1.

*3. Batliboi and Co., Forbes Street, Bombay-1.

*4. The Crompton Engineering Co. (Madras), P.O. Box 205, Second Line Beach, Madras-1.

*5. The English Electric Co. Ltd., D-3, Gillander House, 8, Netaji Subhas Road, Calcutta-1.

*6. The General Electric Co. of India Pvt. Ltd., Magnet House, Chittaranjan Avenue, Calcutta-13.

*7. Mather and Platt Ltd., Hamilton House, 8, Graham Road, Ballard Estate, Bombay-1.

*8. Refrigerators (India) Private Ltd., 59-C, Park St., Calcutta.

*9. Siemens Engineering & Manufacturing Co. of India Private Ltd., Stadium House, Vir Nariman Road, Bombay-1.

@10. Voltas Ltd., 19, Graham Road, Ballard Estate, Bombay-1.

*11. Dodsal Private Ltd., Mafatlal House, Backbay Reclamation, Bombay-1.

H. CONSUMERS :

1. Power Tools & Appliances Co., 2, Dalhousie Square East, Calcutta-1.

2. Walchandnagar Industries Ltd., P.O. Walchandnagar, Poona District.

*3. The Millowners' Association, Elphinstone Building, Vir Nariman Road, Bombay-1.

4. Cooper Engineering Ltd., Satara Road, Distt. Satara.

*5. Hindusthan Aircraft Private Ltd., Bangalore.

*6. Controller of Stores, Northern Railway, Baroda House, New Delhi-1.

*7. Controller of Stores, Western Railway, Churchgate, Bombay.

*8. Chittaranjan Locomotive Works, Chittaranjan, West Bengal.

9. National Machinery Manufacturers Ltd., Kalwe, Thana.

*10. Central India Machinery Manufacturers Co. Ltd., P.O. Birlanagar, Gwalior.

*11. Tata Engineering & Locomotive Co. Ltd., Bombay House, Bruce Street, Bombay-1.

*12. Associated Cement Companies Ltd., 121, Queen's Road, Bombay-1.

*13. Hindustan Machine Tools Ltd., Jalahalli, P.O. Bangalore.

*14. Phaltan Sugar Works Ltd., Sakharwadi, Distt. North Satara.

15. Controller of Stores, Central Railway, Bombay.

*16. Rohtas Industries Ltd., 11, Clive Row, Calcutta-1.

17. Godavari Sugar Mills Ltd., Lakshmiwadi, Dist. Ahmednagar.

*18. The Premier Automobiles Ltd., Construction House, Ballard Estate, Bombay-1.

*19. National Rayon Corporation Ltd., Ewart House, Bruce Street, Bombay-1.

*20. Bombay Dyeing & Manufacturing Co. Ltd., Neville House, Ballard Estate, Bombay-1.

†21. Hindustan Spg. & Wvg. Mills Co. Ltd., 16, Apollo Street, Bombay-1.

I. *Government Departments* :

*1. The Senior Industrial Adviser, Dept. of Technical Development, Ministry of Economic & Defence Co-ordination, Udyog Bhavan, Maulana Azad Road, New Delhi.

*2. The Director, Indian Standards Institution, Manak Bhavan, 9, Mathura Road, New Delhi.

*3. The Collector of Customs, Bombay.

*4. The Collector of Customs, Calcutta.

*5. The Collector of Customs, Cochin.

*6. The Collector of Customs, Madras.

*7. The Development Commissioner, Small-Scale Industries, Udyog Bhavan, Maulana Azad Road, New Delhi.

*8. The Director of Industries, Government of Maharashtra, Bombay.

9. The Director of Industries, Government of Gujarat, Ahmedabad.

*10. The Director of Industries, Government of West Bengal, Calcutta.

*11. The Director of Industries, Government of Madras, Madras.

*12. The Director of Industries, Government of Mysore, Bangalore.

*13. The Director of Industries, Government of East Punjab, Chandigarh.

*14. The Director of Co-ordination & Statistics, Directorate General of Supplies & Disposals, National Insurance Building, Parliament Street, New Delhi.

*15. The Director, Government Test House, 11/1, Judge's Court Road, Alipore, Calcutta-27.

*16. The Director, National Physical Laboratory, Hill Side Road, New Delhi-12.

*17. The Director, Central Mining Research Station, Post Box. No. 50, Dhanbad (Bihar).

*18. Counsellor (Commercial) High Commission of India in the U.K., India House, Aldwych, London W.C. 2.

*19. First Secretary (Commercial) to The Embassy of India, 262, Koblenzor Strasse Bonn (West Germany).

*20. First Secretary (Commercial) to the Embassy of India, 2107, Massachusetts Avenue, Washington-8. D.C.

21. First Secretary (Commercial) to the Embassy of India in Japan, Empire House, (Naigai Building), Marunouchi, Chiyoda-ku, Tokyo, Japan.

II. *State Governments:*

1. Chief Secretary to the Government of Maharashtra, Bombay.
2. Chief Secretary to the Government of Madras, Madras.
3. Chief Secretary to the Government of Mysore, Bangalore.
4. Chief Secretary to the Government of Kerala, Trivandrum.

†5. Chief Secretary to the Government of Orissa, Bhubaneshwar.

6. Chief Secretary to the Government of West Bengal, Calcutta.
7. Chief Secretary to the Government of Assam, Shillong.
8. Chief Secretary to the Government of Uttar Pradesh, Lucknow.
9. Chief Secretary to the Government of Bihar, Patna.
10. Chief Secretary to the Government of East Punjab, Chandigarh.

†11. Chief Commissioner, Himachal Pradesh, Simla.

†12. Chief Secretary to the Government of Jammu & Kashmir, Srinagar.

†13. Chief Secretary to the Government of Rajasthan, Jaipur.

†14. Chief Commissioner, Delhi.

†15. Chief Secretary to the Government of Andhra Pradesh, Hyderabad.

16. Chief Secretary to the Government of Madhya Pradesh, Bhopal.

17. Chief Secretary to the Government of Gujarat, Ahmedabad.

APPENDIX II

(*Vide* Paragraph 3.2)

List of electric motor manufacturing and other factories visited by the Commission and its Officers

Sl. No.	Name of the factory	Name of Members of the Commission and Officers who visited the factory	Date of visit
1	2	3	4
1.	Kirloskar Electric Co. Ltd., Bangalore.	Chairman, Dr. R. Balakrishna, Member. Shri Hari Bhushan, Technical Director (Engineering and Metallurgy). Shri A. K. Ganguli, Asstt. Cost Accounts Officer.	18, 19-2-1963 22-2-1963 4-10-1962 March-April, 1963.
2.	P.S.G. Industrial Institute, Coimbatore.	Shri Hari Bhushan, T.D. (E&M).	17-11-1962
3.	Laxmi Foundry, Coimbatore		
4.	Subbiah Foundry, Coimbatore.		
5.	Karthikeya Foundry, Coimbatore.		
6.	The General Electric Co. of India (Mfg.) Pvt. Ltd., Calcutta.	Shri Hari Bhushan, T.D. (E&M).	21-1-1963
7.	Associated Electricial Industries Manufacturing Co. Pvt. Ltd., Calcutta.	Chairman Shri J. N. Sen Gupta, Member Sri Hari Bhushan, T.D. (E&M).	6-6-1963 7-2-1963 21-1-1963
8.	Electric Construction and Equipment Co. Ltd., Calcutta.	Shri J. N.Sen Gupta, Member Shri Hari Bhushan, T.D. (E&M).	5-2-1963 22-1-1963
9.	British India Electric Construction Co. Ltd., Calcutta.	Shri J.N. Sen Gupta, Member Shri Hari Bhushan, T.D. (E&M).	13th May, 1963 22-1-1963
10.	Government Electric Factory, Bangalore.	Chairman	18, 19-2-1963

1	2	3	4
11.	Bharat Bijlee Ltd., Bombay .	Chairman, Dr. R. Balakrishna, Member and Shri Pramod Singh, Secretary Shri S. N. Raghavan, Asstt. Cost Accounts Officer.	16-5-1963 May, 1963
12.	Devidayal Stainless Steel Industries Pvt. Ltd., Bombay.	Chairman, Dr. R. Balakrishna, Member and Shri Pramod Singh, Secretary.	15-5-1963
13.	Alpha Electrical Engineering Co., Bombay.	Chairman, Dr. R. Balakrishna, Member and Shri Pramod Singh, Secretary.	16-5-1963
14.	Sankey Electrical Stampings Ltd., Bhandup, Bombay.	Ditto.	15-5-1963
15.	Crompton Parkinson (Works) Ltd., Worli, Bombay-18.	Ditto.	16-5-1963
16.	Crompton Parkinson (Works) Ltd., Bhandup, Bombay-78.	Ditto.	15-5-1963
17.	Jemco Private Ltd., Industrial Estate, Madras-16.	Chairman.	2-7-1963
18.	Rajendra Engineering Co. Mount Road, Madras.		

APPENDIX III

(*Vide* paragraph 3.3)

List of persons who attended the public inquiry on 29th May, 1963

PRODUCERS

1. Shri D.G. Goverdhan	Representing	Associated Electrical Industries Manufacturing Co. Private Limited, Calcutta.
2. Shri C.E. Bhasker Rao 3. Shir Kiron J. Zaveri	Representing	Bharat Bijlee Ltd., Bombay-22.
4. Shri N. Krishnan	Representing	British India Electric Construction Co. Ltd., Calcutta-23.
5. Shri M. Phelops 6. Shir V.V. Dhume 7. Shri S.G. Padhye 8. Shri P.K. Oza 9. Shri V.D. Desai	Representing	Crompton Parkinson Works Private Limited, Bombay-18.
10. Shri M.L. Lakhotia 11. Shri L.P. Shah	Representing	Electric Construction & Equipment Co. Ltd., Calcutta.
12. Shri S. Szafranski	Representing	The General Electric Co. of India (Mfg.) Pvt. Ltd., Calcutta-24.
13. Shri K.N. Shenoy	Representing	The Hindustan Electric Co. Ltd., Faridabad (East Punjab).
14. Shri H.H. Patel 15. Shri S.K. Swamy	Representing	Jyoti Ltd., Baroda-3.
16. Shri Ravi L. Kirloskar	Representing	Kirloskar Electric Co. Ltd., Bangalore-3. and Indian Electrical Manufacturers' Association, Calcutta.
17. Shri N.W. Gurjar 18. Shri J.N. Gurjar 19. Shri P.R. Mundewadi	Representing	Kirloskar Electric Co. Ltd., Bangalore-3.
20. Shri C.K. Vyas 21. Shri H.U. Dada	Representing	National Electrical Industries Ltd., Bombay-12.
22. Shri D.P. Poddar	Representing	Motor & Machinery Manufacturers Ltd., Calcutta-12. and Indian Electrical Manufacturers' Association, Calcutta.
23. Shri M.J. Naik	Representing	Nielcon Pvt. Ltd., Bombay-12.
24. Shri M.K. Ajwani	Representing	Heavy Electricals (India) Ltd., Bhopal.

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25. Shri M.C. Dhar 26. Shri P.R. Deshpande	Representing	Indian Electrical Manufacturers' Asson., Calcutta.
27. Shri I.N. Shah	Representing	The Small-Scale Electric Motor Manufacturers' Asson., Bombay-1.

SMALL-SCALE PRODUCERS

28. Shri P.V. Mehta	Representing	Alpha Electrical and Engg. Co., Bombay-1.
29. Shri S.S. Bhangar	Representing	Bhangar Brothers, Bombay-10.
30. Shri C.H. Sheth 31. Shri C.M. Haran 32. Shri S.K. Murthy	Representing	Standard Engineering Works, Bombay-78.

RAW MATERIAL SUPPLIERS

33. Shri S.N. Sircar 34. Shri F.S. Khan 35. Shri K.F. Mogal 36. Shri S.C. Subbaraman	Representing	The Tata Iron & Steel Co. Ltd., Bombay-1.
37. Shri O.T. Aggarwal 38. Shri S.R. Shah	Representing	Devidayal Stainless Steel Industries Private Limited, Bombay-10.
39. Shri V.S. Deshpande 40. Shri N.R. Banerjee 41. Shri F.R. Ladyman 42. Shri V.R. Alagawadi	Representing	Sankey Electrical Stampings Pvt. Ltd., Bombay-1.
43. Shri H. Aggarwal	Representing	Devidayal Cable Industries Private Ltd., Bombay-10.
44. Shri M.C. Thakore	Representing	Shri Shakti Insulated Wires Pvt. Ltd., Bombay-1.
45. Shri P.H. Parikh	Representing	Hindustan Transmission Products Ltd., Bombay-70.
46. Shri K. Doraiswamy	Representing	Dr. Beck & Co. (India) Pvt. Limited, Bombay-1.

IMPORTERS

47. Shri A.S. Marathe	Representing	Batliboi & Co., Bombay-1.

CONSUMERS

48. Shri B.M. Muzumdar	Representing	Walchandnagar Industries Limited, Poona District.
49. Shri A.A. Moses 50. Shri M.S. Sanikop	Representing	The Millowners' Asson., Bombay-1.
51. Shri K. Srinivasan	Representing	Controller of Stores, Bombay.
52. Shri N.K. Paetl	Representing	National Rayon Corp. Limited, Bombay-1.

GOVERNMENT DEPARTMENTS

53. Shri S.P. Sachdev . . .	Representing	Indian Standards Institution, New Delhi.
54. Dr. B.D. Kalelkar . 55. Shri K.N. Ramaswamy	Representing	Department of Technical Development, Ministry of Economic & Defence Co-ordination, New Delhi.
56. Shri B.K. Kale . . .	Representing	The Collector of Customs, Bombay.
57. Shri D.S. Godbole 58. Shri P.K. Raut	Representing	The Director of Industries, Bombay.
59. Shri S.V. Sundaram . . .	Representing	Directorate General of Supplies & Disposals, New Delhi.

सत्यमेव जयते

APPENDIX IV

(*Vide* Paragraph 6.1)

Statement showing the capacity and production of large scale producers

Sl. No.	Name of the Manufacturers	Capacity as adopted in last Report (1961) and as intimated by D.T.D. at present	Additional capacity licensed in h.p.	Production in numbers			Production in H.P.		
				1960	1961	1962	1960	1961	1962
		(h. p.)							
1.	Crompton Parkinson (Works) Pvt. Ltd., Bombay.	216,000	..	32,533	34,895	31,721	164,388	143,866	152,913
2.	Associated Electrical Industries Mfg. Co. (P) Ltd., Calcutta.	83,920	..	5,998	6,739	6,425	50,505	52,095	51,398
3.	National Electrical Industries Ltd., Bombay.	20,000	..	2,280	2,617	4,030	7,307	10,197	13,860
4.	Kirloskar Electric Co. Ltd., Bangalore .	180,000	220,000	24,921	32,434	35,618	208,809	293,058	333,920
5.	P. S. G. & Sons Charity Industrial Institute, Coimbatore.	42,000	..	6,884	5,928	6,471	24,853	24,987	27,690
6.	British India Electric Construction Co. Ltd., Calcutta.	26,320	36,720	5,195	5,377	6,136	41,936	39,483	57,878
7.	Electric Construction & Equipment Co. Ltd., Calcutta.	10,000	29,000	1,932	3,559	2,899	8,647	10,483	13,985
8.	Bharat Bijlee Ltd., Bombay . . .	36,000	111,000	4,566	5,900	7,609	22,600	40,214	42,520

9.	Jyoti Ltd., Baroda	99,000	43,500	6,883	10,382	10,803	49,513	65,947	66,026
10.	General Electric Co. of India (Mfg.) Pvt. Ltd., Calcutta.	80,000	..	6,405	7,510	7,470	60,268	65,799	78,846
11.	Motor & Machinery Mfrs. Ltd., Calcutta	66,000	..	7,929	6,528	6,770	18,324	19,912	20,422
12.	Hindustan Electric Co. Ltd., Bombay (Factory-Faridabad).	65,200	80,000	2,396	2,172	2,812	15,309	14,302	20,087
13.	Argus Engineering Co. Ltd., Coimbatore	6,000	..	50	27	25*	298	110	91*
14.	Eastern Electrical Co. Ltd., Coimbatore	12,000	..	1,017	1,148	1,522	4,400	5,252	5,690
15.	Orient General Industries Ltd., Calcutta	20,000	91,000	8,571	2,208	5,622	4,426	2,024	8,351
16.	P. Govindraj & Sons. P. Ltd., Madras	6,000	..	602	519	794	3,683	2,373	3,565
17.	Ogale Glass Works Ltd., Ogalewadi	600	..	417	606	818	1,823	2,446	3,364
18.	Ramakrishna Mission Vidyalaya, Coimbatore.	5,000	..	1,434	1,310	1,121	4,694	3,819	3,444
19.	Best & Co. (Pvt.) Ltd., Madras	20,000	..	2,091	2,802	3,170	10,373	15,252	15,150
20.	Jay Chand Engineering Works, Coimbatore.	3,000	..	..	..	..	..	..	..
21.	Coimbatore Premier Corporation Pvt. Ltd., Coimbatore.	9,000	..	4,096	3,516	3,110	10,374	14,147	13,575
22.	Engineering Products of India, Bombay	36,000	..	1,115	1,689	2,058	3,182	4,611	5,090
23.	Broadway Engineering & Transport Co. Coimbatore.	5,000	..	1,700	1,604	1,235	3,746	5,111	4,957
24.	Karthi Keya Foundry, Coimbatore	5,000	..	170	273	593	767	1,314	2,638
25.	Vijaya Foundry, Coimbatore	9,000	..	319	Nil.	353	1,411	Nil.	1,538
26.	Beege Corporation (Pvt.) Ltd., Patiala	70,000	..	N.A.	800	1,221**	12,038	..	8,779**
27.	Texmo Industries, Coimbatore	5,000	..	3,406	4,766	3,765	7,969	17,844	16,363
		1,136,040	611,220	132,910	145,399	154,171	740,648	854,641	972,138

*Upto September '62. **Upto June '62.

APPENDIX V

(*Vide* Paragraph 6.2)

Statement showing the statewise distribution of small-scale electric motor manufacturing units along with their production

Sl. No.	States	No. of units	Installed Capacity		Production in 1960		Production in 1961		Production in 1962	
			Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.
1	2	3	4	5	6	7	8	9	10	11
1.	Punjab	18	9,170	13,720	1,641	2,181	2,195	3,629	3,122	4,903
2.	Gujarat	6	4,800	7,200	479	719	956	1,434	1,122	1,683
3.	Rajasthan	1	300	75	..	..	..	..	48	12
4.	U.P.	7	26,000	3,730	665	29	4,326	173	2,870	112
5.	Kerala	2	1,200	2,000	112	305	88	202	62	88
6.	Madras	27	34,480*	132,139	7,636	34,524	10,808	32,850	16,182	44,771
7.	Delhi	9	26,650	39,975	8,784	13,126	6,820	10,230	8,714	13,021
8.	Andhra Pradesh . . .	3	8,660	25,980	766	2,905	1,090	2,752	1,181	3,805
9.	Maharashtra . . .	23	46,190	57,970	16,656	8,316	23,850	13,599	23,082	17,299
10.	Mysore	4	3,010	1,003	250	83	570	190	515	171
11.	W. Bengal	8	24,040	8,930	1,700	608	3,130	1,259	4,945	1,915
	TOTAL .	108	184,500	292,722	38,689	62,796	53,833	66,318	61,843	87,780

*Capacity in Nos. of the five units appearing in D.T.D. list is not available and hence has not been deducted from this figure.

APPENDIX VI

(*Vide* Paragraph 6.3.2)

Statement showing the pattern of production of electric motor manufacturing units

Year 1960

Sl. No.	Name of the Manufacturer	Below 1 H.P.		1 to 30 H.P.		Above 30 to 50 H.P.		Above 50 to below 100 H.P.		100 to below 200 H.P.		200 H.P. and above		Total	
		H.P	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Associated Electrical Industries, Calcutta.	2	3	43,274	5,859	4,064	91	3,164	45	..	..	..	..	50,505	5,998
2	Crompton Parkinson, Bombay.	2,331	7,466	1,53,942	24,906	5,150	124	2,465	37	..	..	..	..	164,388	32,533
3	Kirloskar Electric Co., Bangalore.	3,198	3,601	134,160	20,093	30,175	714	31,425	447	8,940	63	905	3	208,809	24,921
4	General Electric Co., Calcutta.	86	115	46,167	5,999	10,395	236	3,620	55	..	..	..	..	60,268	6,405
5	Jyoti Ltd., Baroda	1,330	2,209	28,119	4,331	10,180	245	6,364	73	3,100	23	420	2	49,513	6,883
6	P.S.G. & Sons, Coimbatore.	596	1,534	24,257	5,350	..	..	..	..	..	..	..	..	24,853	6,884
7	Bharat Bijlee, Bombay.	142	613	21,548	3,932	730	18	180	3	..	..	..	..	22,600	4,566
8	Eastern Elec. & Equip. Co., Coimbatore.	..	..	4,400	1,017	..	..	..	..	..	..	..	..	4,400	1,017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
9	Elec. Constn. & Equip. Co., Calcutta.	42	68	8,605	1,864	..	..	..	..	..	..	..	..	8,647	1,932
10	British India Electric Construction Co., Calcutta.	9	18	36,992	5,068	3,740	91	1,195	18	..	..	..	..	41,936	5,195
11	National Electrical Industries, Bombay.	712	934	6,595	1,346	..	..	..	..	..	..	..	..	7,307	2,280
12	Hindustan Elec. Co., Bombay.	92	154	13,697	2,209	1,240	30	160	2	120	1	..	..	15,309	2,396
13	Orient General, Industries, Calcutta.	1,145	6,998	3,281	1,573	..	..	..	..	..	..	..	..	4,426	8,571
14	P. Govindaraj & Sons, Madras.	6	11	2,677	591	..	..	..	..	..	..	..	..	2,683	602
15	Ramakrishna Mission, Coimbatore.	157	281	4,537	1,153	..	..	..	..	..	..	..	..	4,694	1,434
16	Best & Co., Madras.	..	..	10,379	2,091	..	..	..	..	..	..	..	..	10,373	2,091
17	Ogale Glass Works, Ogalewadi.	29	38	1,794	379	..	..	..	..	..	..	..	..	1,823	417

18 Motor & Macninery Mfs., Calcutta.	1,254	2,368	17,070	5,561	..	..	..	..	..	..	..	..	18,324	7,929
19 Argus Engineering Co., Coimbatore.	..	..	298	50	..	..	..	..	..	..	..	..	298	50
20 Broadway Engg., & Transport Co., Coimbatore.	..	..	3,746	1,700									3,746	1,700
21 Coimbatore Premier Corpn., Coimbatore.	..	..	10,374	4,096									10,374	4,096
22 Engg. Products of India, Bombay.	..	..	3,182	1,115									3,182	1,115
23 Beegee Corpn., Patiala.	..	..	12,038	..									12,038	..
24 Texmo Industries, Coimbatore.	..	..	7,969	3,406									7,969	3,406
25 Karthikeya Foundry, Coimbatore.	..	..	767	170									767	170
26 Vijay Foundry, Coimbatore.	..	..	1,411	319									1,411	319
TOTAL	11,631	26,411	601,285	104,178	65,674	1,549	48,573	680	12,160	87	1,325	5	740,648	132,910

NOTE.—Sl. Nos. 20 to 26 have not given their production below 1 h. p. Only total production upto 30 h.p. has been furnished.

Year 1961

Sl. No.	Name of the firm	Below 1 H.P.		1 to 30 H.P.		Above 30 to 50 H.P.		Above 50 to below 100 H.P.		100 to below 200 H.P.		200 H.P. and above		Total	
		H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Associated Electrical Industries, Calcutta.	29	39	42,096	6,519	5,004	134	2,105	26	2,420	19	440	2	52,095	6,739
2	Crompton Parkinson, Bombay.	4,172	10,754	1,26,259	23,993	7,184·5	164	4,585	60	1,665	14	..	..	1,43,866	34,985
3	Kirloskar Electric Co., Bangalore.	4,452	4,954	1,62,056	25,513	42,790	1,023	51,570	735	26,701	185	5,490	19	2,93,058	32,434
4	National Elec. Industries, Bombay.	657	864	9,539	1,753	..	..	..	..	..	..	..	..	10,197	2,617
5	General Electric Co., Calcutta.	390	520	41,819	6,558	13,180	289	10,135	141	275	2	..	..	65,799	7,510
6	Jyoti Ltd., Baroda	1,566	3,475	42,128	6,542	8,633	223	6,305	92	5,315	46	2,000	4	65,947	10,382
7	Motor & Machinery Mfrs., Calcutta.	396	886	19,514	5,642	..	..	..	..	..	..	..	..	19,912	6,528

8 P. S. G. & Sons, Coimbatore.	151	444	24,746	5,481	90	3	..	..	..	..	..	..	24,987	5,928
9 Bharat Bijlee, Bombay.	173	505	34,556	5,265	5,005	122	480	8	..	..	..	..	40,214	5,900
10 Eastern Elec. Co., Coimbatore.	1	3	5,251	1,145	..	..	..	..	..	..	..	..	5,252	1,148
11 Elec. Constrn. and Equip. Co., Calcutta.	..	..	10,483	3,559	..	..	..	..	..	..	..	..	10,483	3,559
12 British India Elec. Constn. Co., Calcutta.	505	9	33,798	5,240	4,100	95	1,580	33	..	..	..	..	39,483	5,377
13 Argus Engg. Co., Coimbatore.	3	5	107	22	..	..	..	..	..	..	..	..	110	27
14 Hindustan Elec. Co., Bombay.	109	178	11,188	1,930	2,010	51	585	9	410	4	..	..	14,302	2,172
15 P. Govindraj & Sons, Madras.	6	11	2,367	508	..	..	..	..	..	..	..	..	2,373	519
16 Orient General Inds. Ltd., Calcutta.	192	1,158	1,833	1,050	..	..	..	..	..	..	..	..	2,024	2,208
17 Ogale Glass Works, Ogalewadi.	45	78	2,400	528	..	..	..	..	..	..	..	..	2,446	606
18 Best & Co., Madras.	..	..	15,252	2,802	..	..	..	..	..	..	..	..	15,252	2,802

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
19	Ramakrishna Mission, Coimbatore.	172	309	3,647	1,001	..	..	..	..	..	..	..	..	3,819	1,310
20	Broadway Engg. & Transport Co., Coimbatore.			5,110	1,604									5,111	1,604
21	Engg. Products of India, Bombay.			4,611	1,689									4,611	1,689
22	Coimbatore Premier Corpn., Coimbatore.			14,147	3,516									14,147	3,516
23	Texmo Industries, Coimbatore.			17,844	4,766									17,844	4,766
24	Karthikeya Foundry, Coimbatore.			1,314	273									1,314	273
25	Beegee Corpn., Patiala.			..	800									..	800
	TOTAL .	12,519	24,192	6,32,065	1,17,699	87,996·5	2,109	77,345	1,104	36,786	270	7,930	25	8,54,641	1,45,399

NOTE.—Sl. Nos. 20 to 25 have not given their production below 1 h.p. Only total production upto 30 h.p. has been furnished.

Year 1962

Sl. No.	Name of the firm	Below 1 H.P.		1 to 30 H.P.		Above 30 to 50 H.P.		Above 50 to below 100 H.P.		100 to below 200 H.P.		200 H.P. and above		Total	
		H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.	H.P.	Nos.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Associated Electrical Industries, Calcutta.	30	40	42,509	6,233	3,984	102	3,035	36	1,620	13	220	1	51,398	6,425
2	Crompton Parkinson, Bombay.	3,190	7,994	128,792	23,385	8,178	191	9,023	116	3,730	35	..	..	152,913	31,721
3	General Electric Co., Calcutta.	173	230	45,888	6,694	14,330	328	9,420	137	8,635	79	400	2	78,846	7,470
4	Jyoti Ltd., Baroda	1,182	2,738	41,679	7,689	8,780	213	10,175	134	3,580	24	630	5	66,026	10,803
5	P. S. G. & Sons, Coimbatore.	199	416	27,490	6,055	..	..	..	..	..	..	..	..	27,690	6,471
6	Motor Machinery Mfrs., Calcutta.	354	623	20,068	6,147	..	..	..	..	..	..	..	..	20,422	6,770
7	Eastern Electric Co., Coimbatore.	10	64	5,681	1,458	..	..	..	..	..	..	..	..	5,690	1,522
8	British India Electric Construction Co., Calcutta.	20	29	44,561	5,868	6,815	154	6,480	85	..	..	..	..	57,878	6,136

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
9	Elec. Constn. & Equip. Co., Calcutta.	..	..	13,985	2,889	..	..	..	..	..	..	..	..	13,985	2,899
10	Hindustan Elec. Co., Bombay.	92	157	16,259	2,590	1,970	45	845	12	920	8	..	..	20,087	2,812
11	Kirlosker Elec. Co., Bangalore.	738	1,081	182,522	32,364	41,510	992	71,565	936	30,730	219	6,685	26	333,920	35,618
12	Bharat Bijlee, Bombay.	202	875	38,648	6,635	3,160	90	510	9	..	..	..	..	42,520	7,609
13	National Electrical Industries, Bombay.	1,226	1,476	12,634	2,554	..	..	..	..	..	..	..	..	13,860	4,030
14	Vijay Foundry, Coimbatore.	..	..	1,538	353	..	..	..	..	..	..	..	..	1,538	353
15	Orient General Industries, Calcutta.	469	2,823	7,882	2,799	..	..	..	..	..	..	..	..	8,351	5,622
16	Ogale Glass Works Ogalewadi.	..	..	3,364	818	..	..	..	..	..	..	..	..	3,364	818
17	Coimbatore Premier Corporation, Coimbatore.	1	2	13,574	3,108	..	..	..	..	..	..	..	..	13,575	3,110
18	Ramakrishna Mission, Coimbatore.	109	188	3,335	933	..	..	..	..	..	..	..	..	3,444	1,121

19 Broadway Engg. and Transport Co., Coimbatore.	131	227	4,826	1,008	..	..	..	..	..	..	..	..	4,957	1,235
20 Engg. Products of India, Bombay.	156	218	4,934	1,840	..	..	..	..	..	..	..	..	5,090	2,058
21 Best & Co., Madras.	109	218	15,042	2,952	..	..	..	..	..	..	..	..	15,150	3,170
22 P. Govindaraj & Sons, Madras.	..	..	3,565	794	..	..	..	..	..	..	..	..	3,565	794
23 Karthikeya Foundry, Coimbatore.	..	..	2,638	593	..	..	..	..	..	..	..	..	2,638	593
24 Texmo Industries, Coimbatore.	246	453	16,117	3,312	..	..	..	..	..	..	..	..	16,363	3,765
25 Argus Engineering Co., Coimbatore.	..	..	91	25	..	..	..	..	..	..	..	..	91*	25*
26 Beegee Corporation, Patiala.	..	..	8,779	1,221	..	..	..	..	..	..	..	..	8,779**	1,221**
TOTAL .	8,637	19,852	706,401	130,327	88,727	2,115	111,053	1,465	49,215	378	8,105	34	972,138	154,171

* Upto September, 1962.

** Upto June, 1962.

NOTE.—Sl. Nos. 14 and 26 have not furnished their production figures below 1 h.p.

APPENDIX VII

(*Vide* Paragraph 9.1)

Comparative weights of Kirloskar and ASEA (Sweden) motors

H.P. /K. W.	R.P.M./Poles	Kirloskar frame designation	ASEA frame designation	Weight of Kirloskar motor in lb.	Weight of ASEA motor in kg.	Weight of ASEA motor in lb.	Excess of weight of Kirloskar over ASEA as percentage (5÷7)÷7
1	2	3	4	5	6	7	8
1/0·75	3000/2	B 112 a	80 A19	73	9	19·8	268·7
,, ...	1500/4	B 112 a	80 A19	73	9	19·8	268·7
,, ...	1000/6	B 112 b	90 S24	87	13	28·7	203·1
,, ...	750/8	B 132 a	100 L24	122	22	48·5	151·5
1·5/1·1	3000/2	B 112 a	80 B19	73	10	22·0	231·8
,, ...	1500/4	B 112 b	90 S24	87	13	28·7	203·1
,, ...	1000/6	B 112 b	90 L24	87	16	35·3	146·5
2/1·5	3000/2	B 112 b	90 S24	87	13	28·7	203·1
,, ...	1500/4	B 112 b	90 L24	87	16	35·3	146·5
,, ...	1000/6	B 132 b	100 L24	122	22	48·5	151·5
,, ...	750/8	B 132 b	112 M28	146	32	70·5	107·1

3/–	3000/2	B 112 b	90 L24	87	16	35·3	146·5
,, ...	1500/4	B 132 b	100 L24	122	22	48·5	151·5
,, ...	1000/6	B 132 b	112 M28	146	32	70·5	107·1
,, ...	750/8	B 254	132 S38	..	42	92·6	..
4/3·0	750/8	B 284	132 M38	..	52	112·4	..
5/3·75	3000/2	B 132 a	112 M28	122	32	70·5	73·0
,, ...	1500/4	B 132 b	112 M23	146	32	70·5	107·1
,, ...	1000/6	B 254	132 S38	..	42	92·6	..
7·5/5·6	3000/2	B 132 b	132 S38	146	42	92·6	57·7

APPENDIX VIII

(*Vide* Paragraph 9.2)

*Comparative outputs for various frame sizes with class 'E' and class 'A' insulation according to IS:*1231-1962 *with temperature rise of* 50°*C for class 'A' and* 65°*C for class 'E' above* 40°*C ambient temperature along with percentage increase in output by the use of class 'E' insulation*

Frame size	3000 rpm			1500 rpm			1000 rpm			750 rpm		
	50°C Temperature rise output H.P.	65°C Temperature rise output H.P.	Increase in output as a percentage of (2)	50°C Temperature rise output H.P.	65°C Temperature rise output H.P.	Increase in output as a percentage of (5)	50°C Temperature rise output H.P.	65°C Temperature rise output H.P.	Increase in output as a percentage of (8)	50°C Temperature rise output H.P.	65°C Temperature rise ouput H.P.	Increase in output as a percentage of (11)
1	2	3	4	5	6	7	8	9	10	11	12	13
112 S . .	1·5	3	100	1·0	2	100	3/4	1	33	½	3/4	50
112 M . .	3·0	5	67	2·0	3	50	1·5	2	33	3/4	1	33
132 S . .	5	7·5	50	3	5	67	2	3	50	1·5	2	33
132 M . .	7·5	10	33	5	7·5	50	3	5	67	2	3	50
160 M . .	10	15	50	7·5	10	33	5	7·5	50	3	5	67
160 L . .	15	20	33	10	15	50	7·5	10	33	5	7·5	50
180 M . .	20	25	25	15	20	33	10	..	..	7·5	10	33
180 L . .	25	30	20	20	25	25	..	15	..	10	..	..